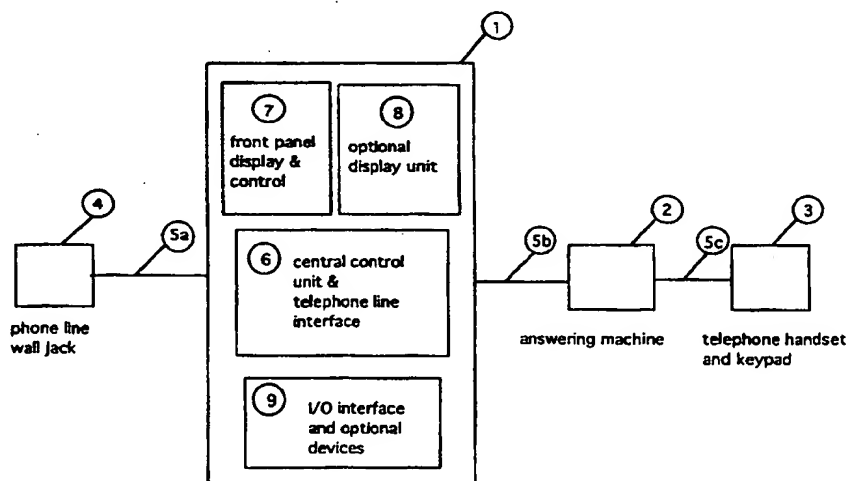




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(54) Title: EVER READY TELEPHONIC ANSWERING MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES



connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

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1
2 **EVER READY TELEPHONIC ANSWERING-MACHINE FOR**
3 **RECEIVING AND DELIVERING ELECTRONIC MESSAGES**
4

5 **BACKGROUND OF THE INVENTION**
6

7 **Field of the Invention**

8 The present invention is generally related to
9 systems for facilitating electronic messages over
10 interconnected computer networks, and more particularly,
11 a system for coordinating and delivering electronic mail
12 messages directly to a novel device for sending and
13 receiving electronic mail messages.
14

15 **Description of the Prior Art**

16 Even with rapid increase in the use of personal
17 computers and computer networks, the benefits of
18 electronic communications in the forms of electronic
19 data (or messages) representing texts, images and sounds
20 are still limited to very small percentage of the
21 population. To the majority of people, the information
22 highway is still too remote. In order to get on the
23 'ramp' of the information highway, more sophisticate
24 processes are required which may involve the use of
25 computer and modem to 'log on' a local server, setting
26 up an account, executing communications programs,
27 sending and receiving messages, and download and upload
28 files. To people in most households, even with a
29 computer and a modem, these tasks are too complicate and
30 not sufficiently 'user friendly'. Even if the
31 technology and the systems are available, there are
32 still many hurdles to overcome before most people can
33 switch to an E-Mail communication mode. Ordinary people
34 are not yet able to take advantage of the existing
35 telephone systems and micro-processors or computers to
36 routinely communicate with 'electronic mail' (E-Mail)
37 for sending and receiving electronic messages.

38 The telephone system has been greatly enhanced and
39 become a widely accepted communication apparatus in

1 households and offices since its invention. The examples
2 include the telephone answering system found in
3 households, the voice mail system used in office
4 environments. The telephone answering system, including
5 a tape recorder and some control circuits, provides a
6 very affordable and easy-to-use telephone apparatus. It
7 answers the incoming phone call by taking a series of
8 steps. It performs an off-hook operation to simulate the
9 action of human-being picking up a handset. Then, it
10 starts the communication by making an announcement and
11 takes the message from the caller by recording the
12 message on an audio tape. When it finishes, it hangs up
13 and sets the incoming message indicator, such as
14 blinking a LED. The party being called can look at the
15 indicator and know immediately how many messages are on
16 the machine. To retrieve the message, all it takes is to
17 push one button. The regular tape recorder functions,
18 such as STOP, PLAY, FAST FORWARD and REWIND, are
19 available to the telephone answering system. The system
20 has been so widely accepted that many manufacturers have
21 integrated the answering/recording functions within a
22 telephone apparatus. The voice mail system takes a step
23 further. It creates individual voice-mail boxes for
24 everyone on the list. It allows the sharing of one
25 telephone answering system but still keeps the privacy
26 of the individual.

27 While voice communication through the telephone
28 becomes part of our daily lives, the widely used
29 computer has created another format of communication-
30 data communication. One of them is electronic mail, or
31 E-mail. The electronic mail may contain text, image and
32 digitized voice. It provides a great alternative of
33 communication among people. Through computer network
34 system, one person can send a mail to another person
35 anywhere in the world as long as the addressee has a
36 computer connected to the same network. The increasing
37 popularity of the global computer network, the Internet,
38 has made the E-mail more useful than ever.

39 These two important ways of communication by the

1 use of telephone and computer networks have worked very
2 well in voice and data communication respectively. More
3 sophisticate computer users are able to use computer
4 with modem to conned with existing telephone networks to
5 manage both data and voice communication, However, since
6 the telephone lines can only be used on a 'dedicated'
7 basis. Voice or data communication is totally blocked
8 for a segment of time when that line is occupied in
9 connecting by modem to computer networks or when two
10 people are talking using' the phone. Because of the
11 nature of operation, an electronic message, which has
12 arrived at a server station, has to wait until a user
13 logs on thus much useful time is wasted. This passive
14 nature of E-mail delivery thus generates waste of useful
15 resources and time when the messages are idle waiting to
16 be retrieved.

17 There are some attempts to integrate a plurality of
18 media communication in office environment Some
19 representative examples are U.S. Pat No.5,333,266,
20 entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN
21 COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994
22 and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM
23 AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM
24 AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to
25 Irribarren on Sept.20, 1994. Both rely on a powerful
26 computer and a local area network to integrate multiple
27 message systems. They were designed for office use not
28 suitable for households or small offices. Another
29 example is U.S. Pat 5,193,110, entitled INTEGRATED
30 SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It
31 is specifically designed for use in the central office
32 of telephone company or in a large corporate office.
33 These inventions do not provide a solution to the
34 difficulties that higher skill level of computer are
35 required for E-Mail communication, Regular daily use of
36 E-Mail communication in homes, college dormitories and
37 small offices are still not so convenient for most
38 people.

39 Popular and routine use of E-Mail communications

1 are still hindered by current requirements of equipment
2 and network configurations. First, the E-mail is limited
3 to those who have access to computers or terminal
4 devices connected to a host computer capable of process
5 E-mail. This may not be a problem in modem offices
6 equipped with computers and networks for connecting to
7 host computers or network servers. But it becomes a
8 significant limiting factor for households and offices
9 without the modem equipment or connecting networks.
10 Secondly, the actual reception of the electronic
11 messages can only be performed when the receiving
12 computers, i.e., terminals for communication, are
13 connected to E-mail server. The usefulness of E-mail is
14 greatly limited in terms of timelines of the messages.
15 In order to assure that no important messages are
16 missed, a user has to log on to the network in a routine
17 manner to 'check the mail' regularly. It may become
18 burdensome during some inconvenient time. In order to
19 resolve this difficulty, Clercq discloses in a U.S. Pat
20 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF
21 THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM
22 (issued on Aug. 1992), an E-mail system for making a
23 call to an E-mail addressee which is triggered when a
24 message is received. An addressee is then required to
25 retrieve the E-mail from remote station by the use of a
26 computer. It may even be more inconvenient than a
27 beeper' as the addressee may not be in a convenient
28 place with access to a computer and modem to log on to a
29 server.

30 Therefore, a need still exists in the art of system
31 design and device manufacture for electronic message
32 communication to overcome these bottlenecks and
33 inconveniences which limit the usefulness of the E-mail.
34 Specifically, it is desirable to provide a telephonic E-
35 mail apparatus which provides functions similar to a
36 phone answering machine which is ready for a user for
37 receiving, viewing or listening to the received
38 electronic messages in a 'plug and play' fashion.
39 Additionally, in order to minimize any inconvenience

1 thus caused to a user, it is desirable to adapt the
2 telephonic E-mail apparatus without interfering existing
3 telephonic communication operations. A user would thus
4 be allowed to operate a telephone or phone answering
5 machine with the E-mail apparatus as if no E-mail
6 apparatus had been adapted into the system. An ordinary
7 telephone user would then be provided with a convenient
8 E-mail apparatus ready to be adapted into a telephone
9 system without requiring the use of a computer and
10 applying computer skills whereby the limitations and
11 difficulties of the prior art can be resolved.

12 Moreover, as more and more people have access to
13 computers providing for electronic mail messaging
14 capabilities via the internet or internal networks,
15 electronic mail messages, commonly referred to as e-mail
16 messages, are becoming an integral part of modern
17 communication. The delivery of an e-mail message occurs
18 virtually instantaneously and the recipient of an e-mail
19 message can reply to the message within minutes of the
20 receipt.

21 However, for the situation where a user is
22 connected via a phone line to the network, special
23 problems exist. In this scenario, e-mail communication
24 requires certain hardware and software combination in
25 order for the user to send and receive e-mail messages.
26 Generally speaking, for connection to the internet via a
27 phone line to a network server, the necessary hardware
28 includes a computer and a communication device such as a
29 modem. Software wise, a mail program for the sending
30 and receiving of e-mail messages is needed.
31 Additionally, there may be a monthly subscriber charge
32 for connect time to the server imposed by a internet
33 service provider if the user is not connected via a
34 prepaid network. Overall, economically speaking, it can
35 be a significant investment to have a computer set up
36 for the sending and receiving of e-mail messages.
37 Moreover, the necessary hardware and software are fairly
38 complex and may be difficult to set up by a novice user.
39 These barriers bar majority of people from communicating

1 with e-mail messages.

2 Even if a user has a complete computer system setup
3 for the sending and receiving of e-mail messages, there
4 are problems with receiving the messages in a timely
5 manner, with power consumption, and with security risks.

6 In order to receive e-mail messages in a timely
7 manner, a user must either manually and periodically
8 dial into a network server or program the computer to
9 automatically and periodically dial into the server to
10 check and retrieve new mail messages. The manual method
11 is a time consuming and tedious process that distracts
12 the user from productive use of his or her time. The
13 automatic method requires that the computer be left on
14 all of the time which wastes power and may incur
15 telephone toll charges every time the computer calls the
16 server. If the network server is programmed to call and
17 deliver a new message to the user's computer upon
18 receiving it, the user's computer must be left on all
19 the time which again wastes power.

20 Moreover, whenever a computer is left on, there is
21 a risk of security breach where there might be
22 unauthorized access to the computer via either the phone
23 line or from the keyboard by an unauthorized person and
24 thereby compromising the user's computer system.

25 All in all, the above described factors prevents e-
26 mail messages from being delivered to every household.
27 Thus, a new e-mail system and a low cost device are
28 needed to provide an universal e-mail messaging system
29 capable of sending and receiving e-mail messages from
30 and to every household.

31

32 SUMMARY OF THE PRESENT INVENTION

33 It is therefore an object of the present invention
34 to provide an apparatus and a new communication system
35 architect and process ready for implementation on
36 existing telephone system to overcome the aforementioned
37 difficulties encountered in the prior art.

38 Specifically, it is an object of the present
39 invention to provide an apparatus ready to adapt to an

1 existing telephone system in a 'plug-and-play' manner to
2 receive and delivery electronic messages including text,
3 images, and digitized voice signals whereby every
4 household with a telephone can easily access to and be
5 benefited by electronic messages without requiring more
6 complicate processes of employing computer and modem and
7 managing the execution of communication programs before
8 such messages can be exchanged thereon.

9 Another object of the present invention is to
10 provide a telephonic electronic message 'answering
11 machine' which is equipped with user friendly features
12 similar to a convention answering machine without
13 interfering with existing telephone functions such that
14 every regular house can apply such an apparatus
15 immediately.

16 Another object of the present invention is to
17 provide an electronic message apparatus which stores
18 initial registration and subsequent logon information
19 therein to automatically dial up several local servers
20 directly, subject to user selection, to perform the
21 initial registration and subsequent logon functions such
22 that more complex functions of registration and logging
23 on to a server can be managed automatically.

24 Another object of the present invention is to
25 provide an electronic message apparatus which can
26 coordinate with a server to perform message screening
27 and message prioritizing functions such that a user can
28 pre-arrange to receive or screen types of messages
29 according to the importance of such messages.

30 Yet another object of the present invention is to
31 provide a method and apparatus for facilitating,
32 sending, and receiving of e-mail messages through
33 interconnected computer networks or telephone networks.

34 A further object of the present invention is to
35 provide a low cost method and apparatus for transmitting
36 and receiving e-mail messages.

37 Yet another object of the present invention is to
38 provide a low cost method and apparatus for delivering
39 e-mail messages incurring minimum telephone toll

1 charges.

2 Briefly, in a preferred embodiment, the present
3 invention includes a telephonic apparatus for processing
4 electronic messages which includes a means for adapting
5 to an existing telephone line for receiving electronic
6 messages including digitized signals. The telephonic
7 apparatus further includes a processing means for
8 responding to the electronic messages and for storing
9 the messages therein. In another preferred embodiment,
10 the telephonic apparatus further includes an user
11 interface means for providing information to an user
12 relating to a reception of the electronic messages.

13 In another embodiment, a system for facilitating,
14 sending and receiving e-mail messages is disclosed.
15 This e-mail system is supported by one or more main
16 servers and a plurality of regional servers
17 geographically distributed in populated areas, and are
18 interconnected via a computer network such as the
19 internet. An incoming e-mail message under this system
20 is first processed and packaged by the main server to
21 allow tracking of this message. The packaged message is
22 then sent to the designated local server via a regional
23 server. The local server receives the e-mail message
24 and notifies or delivers the message to a client (user)
25 e-mail device through one of several available methods.
26 These methods include direct mail delivery, call-back
27 mail delivery, and notify-only. Under the notify-only
28 method, the local server uses an optional ringing
29 protocol to notify the e-mail device that there is a
30 mail message waiting. Under the call-back delivery
31 method, the local server uses the optional ringing
32 protocol to notify the e-mail device, and the e-mail
33 device then calls the local server to retrieve the
34 message. Under the direct-delivery method, the local
35 server calls the e-mail device and delivers the message.
36 The e-mail device is a novel device designed to send and
37 receive e-mail messages. It is a low cost device that
38 may be a stand-alone device, a part of a multi-function
39 device, or a part of a computer expansion card. The

1 servers of the present invention can be maintained and
2 operated remotely.

3 An advantage of the present invention is that it
4 provides a method and apparatus for facilitating,
5 sending, and receiving e-mail messages through
6 interconnected computer networks and/or telephone
7 networks.

8 Another advantage of the present invention is that
9 it provides a low cost method and apparatus for
10 transmitting and receiving e-mail messages.

11 Yet another advantage of the present invention is
12 that it provides a low cost method and apparatus for
13 delivering e-mail messages while minimizing telephone
14 toll charges.

15 These and other objects and advantages of the
16 present invention will no doubt become obvious to those
17 of ordinary skill in the art after having read the
18 following detailed description of the preferred
19 embodiments.

20

21 **BRIEF DESCRIPTION OF THE DRAWINGS**

22 Fig. 1 is a diagram showing how the present
23 invention of the E-mail apparatus connects with the
24 existing telephone answering system.

25 Fig. 2 is a block diagram of the present invention
26 of E-mail capable telephone apparatus.

27 Figs. 2a, 2b, 2c, 2d are preferred embodiments of
28 communication systems which incorporate an E-mail
29 apparatus of the present invention.

30 Fig. 4 is an implementation example of a basic
31 front control panel of the apparatus.

32 Fig. 5 is an example of more complicated or non-
33 frequently used functions menu of the apparatus.

34 Fig. 6 is a flow diagram of the easy registration
35 process.

36 25

37 Fig. 7 is a flow diagram of a typical E-mail
38 collecting process.

39 Fig. 8 is a flow diagram of an E-mail receiving

1 process.

2 Fig. 9 is a flow diagram of the E-mail delivery
3 process on the E-mail sever.

4 Fig. 10 is the overall network connection diagram.
5 It shows how the E-mail ready telephone communicates
6 with the server and the rest of the world.

7 Fig. 11 illustrates a conceptual representation of
8 the internet, a number of servers connected to the
9 internet, and a number of computers connected to each
10 server;

11 Fig. 12 illustrates a conceptual representation of
12 the e-mail system of the present invention utilizing the
13 internet, servers, and e-mail devices;

14 Fig. 13 shows a hierarchial relationship between
15 the main server, regional servers, and local servers;

16 Fig. 14 shows another hierarchial relationship
17 between the main server, regional servers, and local
18 servers where the local servers may be connected
19 directly to the main-server;

20 Fig. 15 illustrates the steps for registering an e-
21 mail device;

22 Figs. 16a-16d show the pseudo code for the
23 procedures residing on the main server for facilitating
24 incoming and outgoing e-mail messages;

25 Figs 17a-17h show the pseudo code for the
26 procedures residing on the local server for interacting
27 with the main server and the e-mail device;

28 Fig. 18a shows a computer expansion card
29 implementation of the e-mail device;

30 Fig. 18b-18c illustrate the pseudo-code for the
31 software residing on the computer system for operating
32 the e-mail expansion card;

33 Fig. 19a-19d show other computer expansion card
34 implementations of the e-mail device used in conjunction
35 with a fax/modem;

36 Fig. 20 illustrates a block diagram of the
37 components in implementing the ringing protocol on the
38 local server side;

39 Fig. 21 illustrates a block diagram of the

1 components in implementing the ringing protocol on the
2 e-mail device side; and

3 Fig. 22 illustrates a block diagram of an
4 integration of a faxing device and the e-mail device.

5 Fig. 23 illustrates a configuration for remote-
6 controlling a server computer using the ringing protocol
7 of the present invention.

8

9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 Referring to Fig. 1, the block diagram shows how
11 the present invention of the E-mail apparatus connects
12 to the telephone and the answering system. A twisted-
13 pair of telephone line 5a connects the phone jack 4 on
14 the wall to the "line" connector on the E-mail apparatus
15 1. Another telephone wire 6 connects the "phone"
16 connector on apparatus 1 to the answering system 2. Then
17 the answering system 2 connects to the telephone
18 (handset and keypad) through line 5c. if there is no
19 answering machine, line 5b connects to the telephone
20 directly. Every incoming phone call will be taken by the
21 E-mail apparatus first. If it is not for E-mail, it will
22 pass the call to the answering system. It is important
23 to maintain the same functionality of the existing
24 telephone answering system when the apparatus is added
25 to the telephone/answering system. It will be clear when
26 we explain the inside of the apparatus 1. In Fig 1. it
27 shows that the apparatus has 4 major building blocks:
28 central control & telephone line interface unit 6, front
29 panel display and control 7, optional display unit 8,
30 I/O interface and other devices 9. Only the central
31 control & telephone line interface unit 6 is needed for
32 every apparatus. The others may have many different
33 combinations.

34 Fig. 2 is the internal detailed diagram of the E-
35 mail apparatus. Processor 11 reads the codes stored in
36 ROM 12 and performs its duty according to the request
37 from the user. For example, if the auto-collect is set
38 up, processor 11 will receive an interrupt signal from
39 interrupt controller 17. The interrupt will be serviced

1 by processor 11 to set up modem 23 through universal I/O
2 bus 20 and dial the designated E-mail server to collect
3 the E-mail. By using an universal I/O bus 20, it makes
4 the architecture flexible to add or reduce its
5 functions. Block 14 contains logic to interface system
6 bus and I/O bus. Blocks 11-20 constitute the basic
7 central control unit. Blocks 21-23 belong to the
8 telephone interface unit. The basic control and display
9 unit has blocks 25 and 26. Block 28 is the display for
10 mail reading and block 27 is the controller for block
11 28. There are two displays in Fig. 2. The small display
12 in 26 is used for control and status information. To
13 display mail, a bigger display 28 is more suitable. If
14 display 28 is built-in, display 26 can be eliminated. If
15 the user relies on data export function to move E-mail
16 files to his computer and to read the mail there,
17 display 26 alone will be enough. Display 28 can be a
18 LCD, monitor or a TV, and display control 27 will be a
19 compatible controller. RAM 12 is a device used as a
20 scratch pad for processor during the execution of the
21 codes from ROM 12. ROM 12 can be a flash memory.
22 Processor 11, ROM 12, RAM 13 and I/O bus controller 14
23 are connected to system bus 15. I/O bus controller
24 allows the processor to communicate with all the other
25 I/O devices. Real time clock 19 keeps track of the time.
26 Timer 18 and interrupt controller 17 are used for
27 program flow control. Clock and power management 16 is
28 used to save the power consumption of the apparatus.
29 when power consumption is not a concern, block 16 can be
30 as simple as a clock chip. Processor 11 responds to the
31 user request from front panel control 26 through panel
32 interface block 25. It also uses panel interface block
33 25 to display other information to user. UART 22 is a
34 serial communication block, it is used to move data
35 between the E-mail apparatus and the external world.
36 Through the modem and telephone line, it connects the
37 apparatus to other communication devices. With a local
38 Rs-232 or infra-red link, it can import/export data
39 to/from a computer, digital organizer or printer.

1 Display control 27 is to display the mail on a display
2 device 28. Some desirable devices such as secondary
3 storage device 21, audio device 29 are optional add-ons.
4 If a reasonable size of flash device is used as storage,
5 block 21 will not be important Telephone interface block
6 24 controls the interface with telephone line, telephone
7 answering system and modem. The details of block 14 are
8 shown in the diagram of Fig 3.

9 There are many electronics devices available to
10 implement Fig 2. Here is one example. Use the single
11 chip platform VG-230 from Vadem (San Jose, California)
12 for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This
13 chip has processor, memory controller, I/O bus and many
14 I/O peripheral devices integrated into a single chip.
15 Modem (block 23) can be the single-chip modem SSI
16 73K321L from Silicon Systems (Tustin, California).

17 Figs. 2a - 2d are preferred embodiments showing
18 some of the possible combinations of the modules. Fig.
19 2a uses TV as a primary display of mail. Block 28 in
20 Fig. 2 is replaced with a television 28a. Flash memory
21 12a is used for codes and mail storage space. This is
22 one of the simple implementations. Fig. 2b is suitable
23 for people who have access to the computer. It is
24 comprised of a floppy controller and drive. The mail is
25 save on a floppy diskette. The user can take diskette to
26 a computer and read mail there. Block 25 can be
27 simplified since there is no need to control the display
28 of mail. This is an example of how to count on data
29 export function to reduce the configuration of the
30 apparatus. Fig. 2c is another example of data export
31 function except using different means of moving data is
32 used. It uses Infra-red link o move data to/from the
33 computer. In both cases, outgoing mail can also be
34 imported from diskette or infra-red-link. Fig. 2d is an
35 example with extensive functions. It contains removable
36 flash memory card 26b using industry standard PCMCIA
37 interface to save mail. It has a built-in LCD display
38 28b for reading mail. An audio device 29a will generate
39 voice if the incoming mail contains a digitized voice

1 file.

2 Fig. 3 is the diagram showing internal block of the
3 telephone interface function. When the system is in idle
4 state (i.e. no incoming phone call), line switch 31 is
5 set to telephone line 35 and interface control 34 and
6 line 39 is open. When there is an incoming phone call,
7 the telephone line interface control 34 will generate an
8 off-hook to the caller and then monitor line 35 to see
9 if it is an E-mail communication from line 38. If it is
10 not, interface control 34 triggers a ring through the
11 ring control 32 and lines 40, 41 and 42 to the telephone
12 answering system. When handset/keypad interface block 33
13 detects off-hook signals on line 37 from the telephone
14 answering system, line switch 31 turns the switch to
15 line 39. Then the telephone is in control. The E-mail
16 apparatus gives up communication to the
17 telephone/answering system. This is a very important
18 process for maintaining the function of telephone
19 answering system function as if the E-mail apparatus is
20 absent. In the case of E-mail communication, line switch
21 31 keeps the phone line connected to 35 all the time.
22 Handset and keypad interface block 33 also becomes
23 active when the keypad is used to control the E-mail
24 apparatus or to edit an outgoing mail. The keypad
25 information will be passed to the processor to respond.

26 Fig. 4 is an example to show the concept of the
27 easy-to-use interface. Block 51 is a simple display
28 panel. Blocks 52-57 are control buttons. Button 58 is a
29 control button and an indicator. A blinking indicator 58
30 means an incoming mail is ready for retrieval. The user
31 can push button 54 to read the mail. At every push of
32 button 54, a full page of mail would be displayed to fit
33 into the size of the display. Push button 55 to jump to
34 the next mail. Button 53 is to display the previous
35 page. Pushing button 52 to jump to the beginning of the
36 previous mail. Pushing button 52 longer means back
37 to the beginning of the first mail and the mail will be
38 overwritten when the next batch of mail arrives. Pushing
39 button 58 will dial, send and collect mail. When it is

1 done, a message will be displayed on block 1 and call
2 indicator 8 will be blinking. Button 56 is used to
3 interrupt the E-mail communication when the user needs
4 to use the telephone. Button 57 is a special function
5 button. It provides more complicated or unusual
6 functions. It brings a menu of functions for the user to
7 select. The functions may include registration, mail
8 forward, and mail hold request. The list in Fig. 5 is an
9 example for those functions. The concept of separating
10 all the basic and frequently-used functions from the
11 complicated and infrequently-used functions by different
12 interfaces makes the E-mail apparatus a user-friendly
13 device while maintaining some advanced functions.

14 Fig. 5 exemplifies a list of the menu of more
15 complicated and infrequently-used functions. Function 1
16 is a guided registration process function. Function 2 is
17 to set the current time. Function 3 is to set the
18 programmable secret code. Function 4 is to change the
19 number to dial other than the designated E-mail server.
20 Function 5 is to request E-mail server to hold the mail.
21 Function 6 is to request the forwarding of the mail.
22 Function 7 is to set up the daily auto-dial and connect
23 time with the E-mail server. Function 8 is for data
24 import/export. Function 9 is to display your e-mail
25 address. Function 10 is to request the change of E-mail
26 address if you don't like the assigned address after
27 registration. Function 11 is to run diagnostics on the
28 unit. By pushing button 57 in Fig. 5, the menu of
29 functions will be on the display 51 in Fig. 4. Every
30 push will display next function. Button 58 is used to
31 select the function. When the function is selected, the
32 software in apparatus will guide user through the
33 process. If the unit has a bigger LCD display built-in,
34 it may display all the function at once, and the user
35 can move the cursor around the menu to select the
36 function.

37 Whenever the apparatus does not detect any action
38 from the user for an extended period of time, such as 10
39 minutes, it aborts all the incomplete process and resets

1 to the idle state.

2 Therefore, the present invention discloses a
3 telephonic apparatus for processing electronic messages
4 which includes a means for adapting to an existing
5 telephone line for receiving electronic messages. The
6 telephonic apparatus further includes a processing means
7 for responding to the electronic messages and for
8 storing the messages therein. In another preferred
9 embodiment, the telephonic apparatus further includes an
10 user interface means for providing information to an
11 user relating to a reception of the electronic messages.

12 Fig. 6 is the flow chart of a typical registration
13 process. The user only needs to push a few buttons (step
14 101 in the diagram) and enter the phone number (step
15 103). The process will automatically take place by doing
16 steps 104-111 and an E-mail address will be assigned and
17 displayed (step 108). Step 111 is to search the phone
18 number of the best E-mail server for the user to dial in
19 based on user's phone number and save the number in the
20 apparatus.

21 There are two ways to communicate between an E-mail
22 apparatus and its server. One way is auto-connect, the
23 other is the conventional logon process. when the E-mail
24 apparatus initiates a call to the server, the server
25 will try to auto-connect first. It is an automatic
26 process and requires no user attendance. The first
27 requirement for the auto-connect is that the server
28 knows the user's E-mail address and the machine ID of
29 the E-mail apparatus. The second requirement is that the
30 server and the E-mail apparatus have the same derived
31 password. The derived password is a code generated by an
32 equation based on the P code (programmable code), the
33 user's phone number and the machine ID. In order to do
34 transaction, both need to share the same equation.
35 Checking the machine ID and the derived password, the
36 server can determine the legitimacy of the request from
37 the E-mail apparatus. The auto-connect provides the
38 convenience of automatic downloading mail. But if the
39 checking fails, the server will ask the user to enter

1 the password. This is the case when a different machine
2 is used to download mail, the E-mail apparatus has a
3 different machine ID. The server will not use auto-
4 connect, and a conventional logon process is required to
5 access for security reasons.

6 In the case of a server initiating the call to an
7 E-mail apparatus, the auto-connect is the only way to
8 communicate and get/give access. In other words, only
9 the designated server can deliver mail to the designated
10 E-mail apparatus. This is to provide security and
11 convenience. if the user gets a new E-mail apparatus, a
12 change of registration is required to get the auto-
13 connect function.

14 The following is a detailed process of the access
15 legitimacy checking in the auto-connect mode. First, the
16 apparatus sends its unique serial number (i.e. machine
17 ID) to the E-mail sever. Secondly, the apparatus sends
18 its E-mail address to the server. if these two do not
19 match, the server will ask the user to enter the
20 password and the conventional logon process takes place.
21 Otherwise, the E-mail apparatus will proceed to send its
22 programmable code or P code and the derived password to
23 the server. The derived password is generated from the
24 machine ID, P code and user's phone number. It is sent
25 to the server and compared against the derived password
26 from the server. If the server checks and finds it
27 correct the access is authorized. The programmable code
28 or P code to the E-mail sever is used as an instruction
29 to screen the incoming mail and to generate a derived
30 password.

31

32 Fig 7. is the flow diagram to show how the
33 apparatus connects to the E-mail server, sends the
34 outgoing mail and receives the incoming mail. It can be
35 performed on a predetermined time daily (which starts
36 from step 122 in the diagram) or upon the request from
37 the user (which starts from step 121 in the diagram).
38 Steps 127, 129 and 130 are where security and screening
39 processes take place. Steps 134-138 are designed to

1 prevent the overflow of incoming mail and protect the
2 integrity of the received mail. The details are
3 explained later.

4 Fig 8. is the flow diagram of how an E-mail
5 apparatus responds to a request from the server.
6 whenever there is an incoming call, the apparatus will
7 do "off-hook" (step 142) and check if it is an E-mail
8 request (step 143). if it is not, the call will be
9 directed to regular voice communication as steps 144-
10 146. Otherwise, it proceeds to step 147. If the machine
11 ID and derived password checking passes, the transaction
12 starts. if it fails, the call is terminated. Step 148 is
13 an option. It will inform the addressee of a potential
14 problem on the mail delivery. The mail transfer
15 transaction can process the outgoing mail (step 149) and
16 check if the total mail size fits into the E-mail
17 apparatus. if not, only parts (extracted) of the mail
18 are delivered (step 153). Before terminating the
19 process, the incoming mail indicator is updated (step
20 155).

21 The following is the detailed description on how
22 the E-mail server screens the incoming mail. It includes
23 sorting, extracting and repackaging before the delivery
24 of the mail.

25 The present invention uses the extension of the E-
26 mail address and the programmable codes or P code
27 received from the apparatus to determine the importance
28 of the incoming mail. The E-mail address is based on the
29 naming convention on the Internet, called Domain Name
30 System (DNS), with additional field. The DNS has the
31 general format as:

32 <someone>@[subdomain].[subdomain].[...].<domain>
33 where the <...> represents required elements and [...] is
34 optional portion. A typical example looks like:
35 jsmith@sales.abc.com for John Smith in the sales
36 department of ABC corporation "jsmith" is the account
37 name for John Smith. It is assigned to him by the system
38 administrator of the host computer. Usually, it is the
39 logon name used to access the host computer. And abc.com

1 is the name of the host computer connected to the
2 Internet network There is governing body for the host
3 name assignment The name will be translated into 'P
4 address and recognized by the peer on the network Hence
5 a mail from bigbird@xyz.com can be delivered to abc.com
6 host computer through the global network, internet. When
7 the host computer named abc.com receives the mail, it
8 knows its subdomain, sales. It sends the mail to the
9 internal E-mail server in sales department of ABC
10 corporation. When John Smith logons the computer, he
11 will be notified of the arrival of the E-mail.

12 The present invention uses some extensions on top
13 of the DNS to provide some enhancements. The new
14 extended E-mail address for jsmith@sales.abc.com become
15 jsmith[.<specialcodes>]@sales.abc.com. The general
16 format becomes:

17 <<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>

18 One example looks like:jsmith.4567ER@sales.abc.com.
19 Here "4567" is used to compare with the P code on the
20 apparatus. The result of the comparison determines the
21 importance of the incoming mail. An incoming mail with
22 special codes completely matching the P code will get
23 the highest priority. A mail with partially matched
24 codes will gain some attention based on how close the
25 address extension codes compare with the security code.
26 In the above examples, "E" indicates the mail is Express
27 mail, so it will be delivered in a more timely fashion.
28 The "R" indicates the mail is registered. It requires a
29 return receipt when the mail is delivered successfully.
30 A mail without the special codes on the E-mail address
31 will be treated by the E-mail server as a regular bulk
32 mail.

33 Since the E-mail ready telephone apparatus is
34 likely to be a small special-purpose device, the
35 relatively limited capacity requires more careful
36 management The P code provides a very simple way to sort
37 the incoming mail and prevent the flooding of the junk
38 mail. But, even with the screening feature, the
39 unexpected volume of incoming mail may still cause mail

1 box overflow. The mail repackaging function on the
2 server will prevent this from happening. It works as
3 follows.

4 After the legitimacy checking, the E-mail server
5 gets the information of available storage on the E-mail
6 apparatus and decides what to send. If the total size of
7 the incoming mail exceeds the available storage space on
8 the apparatus, the E-mail server extracts the incoming
9 mail and "repackages" the E-mail and sends it to the
10 apparatus. The extracting process may reduce the mail
11 size by taking the whole content of high priority mail
12 but only the subject, name of sender from the lower
13 priority mail. It may use a complicated method to
14 achieve the best result from extracted mail. The
15 protocol puts the intelligence and complexity to the E-
16 mail server but keeps the E-mail apparatus simple. It is
17 an important concept in the present invention.

18 Fig 9. is the flow diagram of how an E-mail server
19 processes the mail. Step 166 actually is a two-step
20 process as explained before in Fig. 7. Step 170 sending
21 the outgoing mail and steps 171-172 checking and sorting
22 incoming mail can be done in parallel. Different class
23 of mail may take different steps as shown in step 163
24 (for express mail) and step 176 (registered mail). This
25 flow diagram exemplifies how a mail is processed.

26 Fig. 10 exemplifies the overall network connection.
27 The E-mail ready telephone 200 connects to its local E-
28 mail server 202 through the existing telephone network
29 201. Usually, the local E-mail server 202 connects to
30 the host computer 204 with a LAN (local area network)
31 203. A global network 205 links the host computer 204
32 and 206 together. The network 205 usually is a WAN
33 (wide-area network). Computers 208, 209, 210 and the host
34 computer 206 are connected by a LAN 207. A user can send
35 an E-mail from computer 208 to an addressee of the E-
36 mail ready telephone system 200. The E-mail will travel
37 to the host computer 206 through the LAN 207. The host
38 computer 206 serves as a gateway to the global network
39 205. The mail will be passed to the WAN 205. It may

1 travel through several host computers before reaching
2 the host computer 204 which has the correct domain name
3 of the E-mail address. Then the host computer 204 will
4 look at the E-mail address or the sub-domain name and
5 send the mail to Local server 202 through Local server
6 203. The mail will stay in the server and the process of
7 Fig. 9 takes place. The server will deliver the mail
8 either by dialing the addressee's phone number or by
9 just waiting for the request from E-mail ready
10 telephone. Those are the process flows in Figs. 7 and 8.
11 All the communication process, including legitimacy
12 checking, mail size checking and mail transfer, taken
13 place between the server and the E-mail ready apparatus
14 are through the telephone network 201. when the E-mail
15 apparatus initiates the connection, as described in the
16 process flow of Fig. 7, the server will check if it is
17 the right machine before giving the mail. If the machine
18 ID checking fails, the user has to enter the password to
19 gain access. If the server initiates the call to the E-
20 mail apparatus and finds the incorrect machine ID, mail
21 won't be delivered. But the E-mail apparatus will
22 signifies the addressee of the failed attempt In any
23 case, the server has to request the information of the
24 available storage space on the E-mail apparatus before
25 sending the mail. It may be necessary for the server to
26 determine the priority of the mail based on the p code
27 and extract partial information for delivery. In other
28 words, it is server's responsibility to deliver the
29 proper size of mail to the apparatus.

30

31 DETAILED DESCRIPTION OF A SECOND EMBODIMENT

32 Referring to Fig. 11, the network infrastructure
33 (for a network such as the internet) 1014 is comprised
34 of a number of interconnected servers 1012 communicating
35 with each other using a common protocol (such as
36 TCP/IP). A user may communicate to another user by
37 using a computer 1010 that is connected to a server that
38 has a point of presence on the network. The user may
39 then send a mail message to another user having an

1 address at a computer connected to another server.
2 Under this paradigm, computers are needed at both ends
3 of the communication link and the costs for the
4 computers may be quite high. Additionally, local area
5 network (LAN) is used extensively in the corporate
6 environment to connect the user's computer to the mail
7 server. The LAN allow the user's computer to
8 communicate to mail server in real time which acts like
9 a local post office in the e-mail world. Real time
10 communication between the user computer and the server
11 allows e-mail messages be sent and received in a timely
12 manner. However, LAN or any existing real time network
13 is expensive and difficult to install for small
14 businesses and households. In these situations, a phone
15 line (voice or ISDN) is used for most people to
16 communicate with the mail server from their home
17 computers. This approach reduces the cost at the price
18 of real time connection. Without real time
19 communication, the communication efficiency and
20 convenience is greatly reduced.

21 Referring to Fig. 12, an e-mail messaging system of
22 the present invention utilizing the existing internet
23 infrastructure is presented. The user can use a low
24 cost e-mail messaging device 1018 to communicate with a
25 mail server 1016 or another e-mail messaging device
26 1018. The device in accordance with one embodiment of
27 the present invention is simply a low cost stand alone
28 device capable of receiving a notification that one or
29 more e-mail messages have been received at the local
30 server 1016 waiting for retrieval. The device also is
31 capable of identifying an incoming signal as an e-mail
32 message signal, receives the incoming e-mail messages
33 and stores them. Moreover, the device can provide the
34 needed functional components for the user to compose an
35 e-mail message and deliver the e-mail message to the
36 local server or another e-mail device directly. The e-
37 mail device uses minimum set of electronic components
38 and consumes very low power when compared to the power
39 consumption of a computer. It can be left on like an

1 answer machine. There are also other possible
2 embodiments of the e-mail device.

3 Fig. 13 illustrates the preferred hierarchy for the
4 e-mail messaging system. At the top level, there is a
5 main server 1020 receiving e-mail messages from the
6 internet network and sending e-mail messages originated
7 from the client e-mail devices to the network. The main
8 server may be one or more computers sharing a
9 centralized database. The main server 1020 distributes
10 and receives e-mail messages from a number of regional
11 servers 1022. Each regional server 1022 is designated
12 to serve a particular geographical area and serves one
13 or more local servers 1024. The local servers 1024
14 interact with the client e-mail devices 1026 within its
15 geographical area. The client device is designated to
16 be a simple, low-cost electronic device suitable for
17 home or business use, and it is further described infra.

18 To illustrate the message flow, the main server
19 1020 receives an e-mail message, identifies the e-mail
20 address, determines the regional server 1022 for this e-
21 mail message, and sends it to the corresponding regional
22 server 1022. The regional server may be designated to
23 serve a city or a greater metropolitan area involving
24 several area codes. After it receives a message, it
25 forwards the message to the local server. A local
26 server is designated for each sub-region and directly
27 serves the clients and their e-mail devices.

28 Implementation wise, a regional server and a local
29 server may be logically separate systems residing on the
30 same physical machine. Each local server is equipped
31 with the necessary hardware and software to communicate
32 with clients' e-mail devices.

33 In an alternate embodiment, referring to Fig. 14,
34 the main server 1020 may communicate directly with local
35 servers to send and receive e-mail messages to and from
36 the client e-mail devices.

37 Although the illustrated embodiments show a
38 hierarchial structure, it is within the scope of the
39 present invention to implement the present invention in

1 a distributive structure.

2 In order to provide direct e-mail messages to each
3 client, each client is identified by an unique e-mail
4 address, and must be registered with the e-mail system
5 in order for the e-mail system to interact with the e-
6 mail device. Typically, the e-mail device is accessed
7 via a local telephone line such as a voice, data or ISDN
8 line.

9 Fig. 15 illustrates the steps for the registration
10 process where an e-mail device (as operated by the
11 client) dials a toll-free number, logs on the main
12 server, and the main server performs the illustrated
13 steps. First, the main server requests and obtains the
14 machine identification number unique to the particular
15 e-mail device. The machine identification number
16 identifies the device type and also provides for theft
17 prevention. Secondly, the main server gets the security
18 code (password) entered by the user. The use of a
19 security code minimizes the possibility that the mail
20 messages being delivered or received by the wrong party.
21 Next, the main server fetches the notification code from
22 the e-mail device. The notification code is an optional
23 ringing protocol used by the main server to provide a
24 notice to the e-mail device through the use of ring
25 tones without incurring telephone toll charges.

26 The phone number for connecting to the e-mail
27 device is provided to the main server. For the given
28 phone number, the main server finds the corresponding
29 local server and its phone number, and sends this phone
30 number to the e-mail device. The e-mail device stores
31 it in its memory for future use. Finally, the main
32 server completes the registration process by completing
33 and inserting a new client information entry into the
34 centralized database.

35

36 Main Server

37 To track information on the clients, the local
38 servers, and the regional servers, two tables are
39 maintained by the main server. In table one, each

1 client's name, phone number, e-mail address, the local
2 server for the client, and other administrative or
3 accounting information are kept.

4 TABLE 1

5 Client Name	E-Mail Addr	Local Server	Phone Number	Other Info.
6 John Smith	jsmith	1	(210) 231-1234	
7 Bob Clinton	bclinton	1	(210) 231-7890	
8 Al Goodman	agoodman	2	(123) 789-1234	
9 Mike White	mwhite	2	(123) 789-4321	

10
11 Table two contains information for each local ,
12 server, information such as the address of the regional
13 server for the local server and the type of connection
14 from the main server to the regional server.

15 TABLE 2

16 Local Server	Regional Server Address (e-mail)	Connection Type
17 1	system@region1.com	Internet
18 2	postmaster@region2.com	(210) 111-1234 (leased line)

19
20 For example, there are two local servers illustrated in
21 table two. The regional server for local server one is
22 connected to the main server via the internet, and the
23 regional server for local server two is connected to the
24 main server via a leased line for high speed
25 communication. Other types of connection methods
26 between the regional servers and the main server can be
27 utilized as well (e.g. satellite) if they are
28 economically feasible. Additional tables can be created
29 and maintained as needed.

30 For the purpose of organizing incoming e-mail
31 messages, a mailbox is dedicated to each client and
32 maintained by the main server. The mailbox can be a
33 file or any other type of indexable storage system.

34 Referring to Fig. 16a, the main server is

1 instructed to check for and process incoming and
2 outgoing mail messages every x minutes where x is a
3 defined period of time which can be a function of the
4 load on the system.

5 Referring to Fig. 16b, the steps for processing
6 outgoing mail messages are illustrated. Outgoing mail
7 messages come from clients of the e-mail system for
8 delivery to other users on the net. This process is
9 performed every so often to ensure mail is processed in
10 a timely manner. If there is a new mailbag from a local
11 server, the new mailbag is decompressed, and the mail
12 messages are extracted from the mailbag and passed to
13 the send mail utility. The send mail utility can be a
14 common mail program (e.g. Unix Operating System sendmail
15 utilities) with the capability of sending and receiving
16 e-mail messages.

17 Fig. 16c illustrates the steps for processing
18 incoming mail messages where a mailbag is prepared for
19 each local server. The local servers are indexed
20 consecutively starting with index equals one 1030. For
21 each local server, a new mailbag is initialized 1032.
22 For each client serviced by the particular local server,
23 the client's mailbox is searched, and new messages are
24 extracted and appended to the mailbag for the particular
25 local server 1034. The new mail messages are then
26 deleted from the mailbox for the client 1034.

27 If the mailbag is not empty, the mailbag is
28 compressed, and a confirm flag is set 1038. If the size
29 of the mailbag after compression is greater than the
30 maximum size allowed for mail delivery, the mailbag is
31 split into two or more smaller mailbags. A copy of the
32 mailbag(s) is then stored in a To-Be-Confirmed directory
33 for later confirmation, and the mailbag(s) is sent to
34 the regional server for the particular local server.

35 After all of the mailboxes for a particular local
36 server have been processed, the process repeats until
37 all of the local servers' mailbags have been processed.

38 The main server also performs a confirmation
39 process to ensure that the mailbags and the individual

1 mail messages have been received. Referring to Fig.
2 16d, the steps for the confirmation process is
3 illustrated. Every so many minutes, the confirmation
4 process is executed. For each confirm flag that is set
5 (confirm [i]=true), the main server searches for a
6 confirmation message from the corresponding local
7 server. If a confirmation message is found and not all
8 the mail messages have been delivered and the elapsed
9 time is greater than the maximum allowed elapsed time,
10 the undelivered mail message is placed in an undelivered
11 mail directory and the operator is notified. If the
12 confirmation message is not found and the elapsed time
13 has exceeded a maximum allowed elapse time, the operator
14 is notified. If all the mail messages are confirmed as
15 successfully delivered, the mail bag is placed into
16 archive.

17

18 Regional Server

19 The function of the regional server is to serve as
20 an intermediary between the main server and the local
21 servers. The regional server is configured to have the
22 function of an ISP Point-of-Presence (like an internet
23 service provider) in order to receive and send mail via
24 the internet. It maintains a shell account and a
25 mailbox for each of the local server it serves. The
26 regional server interacts with its local servers to
27 facilitate the handling of incoming and outgoing
28 mailbags. The mail utilities commonly available with
29 the operating system (e.g. Unix) of the regional server
30 can be utilized to achieve the tasks described.

31 The regional server can be configured to operate as
32 a local server as well.

33

34 Local Server

35 Each local server maintains a table of clients.
36 For each client, referring to Table 3, the client's
37 name, e-mail address, phone number, notification type,
38 ringing protocol, security code, machine ID, and other
39 miscellaneous information are kept.

TABLE 3

Name	E-Mail Address	Phone Number	Notification Type	Ringing Code	Security Code	Machine ID
John Smith	jsmith	(210) 231-1234	notify-only	0.5/ 0.25	123	789
Bob Clinton	bclinton	(210) 231-7890	call-back	0.3/ 0.5	456	111

There are three notification/delivery types: notify-only, call-back mail delivery, and direct mail delivery. In the notify-only notification method, the local server calls the client's e-mail device using the specified ringing protocol from the table. No connection is actually made between the local server and the e-mail device. The rings are set up in such a manner that the e-mail device is programmed to recognize the ring pattern and determine that a notification is being delivered by the local server. When the notification is successfully received, the e-mail device activates an indicator light on the e-mail device. The client/user can then retrieve the message at his or her convenience using the e-mail device or other means. If in the process of notifying the e-mail device, an actual connection is made, the e-mail device can be set to call the local server to retrieve the e-mail messages or messages can be directly delivered.

In the call-back mail delivery method, similar to the notify-only method, the ringing protocol is used to notify the client's e-mail device that there is one or more e-mail messages waiting at the local server. The notification causes the e-mail device to call the local server and retrieve the e-mail messages.

In the direct mail delivery method, the local server calls the e-mail device, connects with the e-mail device, and delivers the e-mail messages to the e-mail device. The client may designate any one of the three notification methods as long as it is supported by the

1 e-mail device and the local server.

2 The optional ringing protocol is a method for the
3 local server to provide notice to the e-mail device
4 without incurring toll charges. It utilizes and
5 controls the length of ring time and the length of time
6 between rings. Using this method, a calling device
7 (here the local server) dials the number, detects ring
8 tone for x_1 second(s), hangs up, waits for w_1 second(s),
9 dials the number again, detects ring tone for x_2
10 second(s), and hangs up. The receiving device (here the
11 e-mail device) upon detecting this particular ringing
12 protocol determines that a notice is being delivered by
13 a calling device, and accordingly executes a
14 preprogrammed routine (if any). The ringing procedure
15 of dial, detect, hang up, and wait is not limited by a
16 specific number of iterations and may be repeated a
17 number of times. In the preferred embodiment, this
18 procedure is repeated three times, using x_1 , x_2 , x_3 and
19 w_1 , w_2 . The method may be simplified by setting w_1 and
20 w_2 to have the same length of time. Other combinations
21 are possible as well as long as the e-mail device is
22 configured to detect and recognize the designated
23 ringing protocol. In the preferred embodiment of the
24 present invention, a ringing code, n/m , is used for each
25 client where x_1 is a constant, x_2 equals x_1+n , and x_3
26 equals x_1+n+m . Referring to Table 3, for client John
27 Smith, a ringing code of 0.5/0.25 refers to x_2 being
28 $x_1+0.5$ second and x_3 being $x_1+0.5+0.25$ second, where w_1
29 and x_1 are constants. Similarly, the ringing code for
30 Bob Clinton is 0.3/0.5 which refers to x_2 being $x_1+0.3$,
31 and x_3 being $x_1+0.3+0.5$, and w_1 and x_1 again being
32 constants. Generally speaking, the ringing tone should
33 not be very long. Note that generally speaking it is
34 more reliable to use the difference between ring tones
35 rather than timing the duration of each ring tone.

36 In utilizing the ringing protocol with
37 communication switching devices in a central office
38 where a switching device passes back a signal informing
39 the calling device that the switching device is dialing

1 and ringing the line, once the calling device receives
2 such a signal, the calling device can determine the
3 length of ring time and hang up accordingly. Other
4 implementation of the above described method can be
5 applied to other types of calling devices and/or
6 switching devices as well.

7 A security code (client password) may be set by the
8 client to provide additional security measures. In
9 order to protect the e-mail device itself from theft (as
10 well as the e-mail messages) a machine identification
11 number (serial number) particular to each machine is
12 used. Thus, if the e-mail device is ill-gotten by
13 another, it will not work. The machine ID also allows
14 the local server to identify the e-mail device machine
15 type.

16 In facilitating mail delivery, the local server
17 interacts with the regional server/main server and
18 clients' e-mail devices.

19 In interacting with the regional server, referring
20 to Fig. 17a, the local server checks for one or more new
21 mailbags from the regional server every x minutes. If a
22 new mailbag is found, the mailbag is decompressed, mail
23 messages are extracted from the mailbag and placed into
24 the mailbox for the particular client.

25 Referring to Fig. 17b, every so often each client's
26 mailbox is checked to see if there are any e-mail
27 messages need to be delivered. If the mailbox for the
28 particular client is not empty, the e-mail message(s) in
29 the mailbox is delivered via the designated
30 delivery/notification method for the particular client,
31 i.e., one of the available delivery/notification
32 methods. For each of the delivery/notification methods,
33 there is a corresponding procedure call.

34 For the notify-only method, referring to Fig. 17c,
35 the last time the local server interacted with the
36 client's e-mail device (logon time) is fetched. If no
37 new mail has arrived since the last logon time, the
38 process ends. If there is one or more new e-mail
39 messages and no notification has been sent to clients'

1 e-mail devices yet, the ringing protocol described above
2 is applied. First the local server calls the client's
3 e-mail device. If the client's phone line is busy, the
4 local server waits a few minutes before attempting to
5 call the e-mail device again. If the phone line is not
6 busy, the local server, through its interfacing
7 hardware, detects the ring tone for x1 period of time
8 and hangs up, wait w1 period of time, and calls the e-
9 mail device again. If the line is busy, the process
10 starts over after waiting a certain period of time.
11 Otherwise, the local server detects ring tone for x2
12 period of time and disconnects. The local server calls a
13 third time, rings for x3 period of time and hangs up.
14 This completes the notification process.

15 For the call-back mail delivery method, referring
16 to Fig. 17d, the above described notification process is
17 used, and the local server sets the hardware
18 communication device in auto answer mode. If the
19 client's e-mail device calls back before the end of a
20 specified time period, a handshaking process is executed
21 to verify the security code and the machine code. Then,
22 any outgoing mail messages is retrieved from the e-mail
23 device and any incoming mail is delivered to the e-mail
24 device. When the file exchange process is completed,
25 the line is disconnected, a confirmation signal on the
26 successful delivery of the e-mail messages is sent to
27 the main server via the regional server, and any
28 outgoing mail messages is sent to the main server via
29 the regional server as well. If the e-mail device does
30 not call back after a set period of time and if the try-
31 counter (that keeps count the number of tries) exceeds a
32 maximum try value for the delivery of the messages, it
33 is deemed that mail delivery has failed and an error
34 messages is generated and sent to the regional server to
35 forward to the main server. Otherwise, the try-counter
36 is incremented and the program flow starts from label 2
37 again to repeat the process.

38 For the direct mail delivery method, referring to
39 Fig. 17e, a try-counter is initialized and the local

1 server calls the client's e-mail device. If the e-mail
2 device fails to respond, the try-counter is incremented;
3 and if the try-counter is greater than a maximum try-
4 counter value, an error is deemed to have occurred and
5 an error message is generated and sent to the server.
6 Otherwise, the process is repeated by branching off to
7 label 3. If the e-mail device responds, the process for
8 handshaking, exchanging of any outgoing and any incoming
9 e-mail messages, sending of a confirmation signal, and
10 sending of any outgoing mailbag as above described for
11 the call-back mail delivery process is executed.

12 In the handshaking process, referring to Fig. 17f,
13 the security code is first verified. If the security
14 code is incorrect, the handshaking process stops and
15 down stream procedures are not executed. This condition
16 is reported to the regional server and the main server
17 for special handling. The machine ID verification
18 process of the e-mail device is similar to the security
19 code verification process.

20 In the exchange-mail-files process, referring to
21 Fig. 17g, the local server connects to the e-mail device
22 and retrieves any outgoing mail from the e-mail device.
23 Next, the amount of available storage in the e-mail
24 device is determined. If the size of the incoming mail
25 messages is greater than the available storage size, the
26 incoming mail messages are repackaged. The repackaged
27 incoming mail is then sent to the e-mail device, and the
28 process ends. In repackaging the incoming mail
29 messages, referring to Fig. 17h, the incoming mail
30 messages are sorted in order of priority where priority
31 is determined by factors such as the priority code of
32 the message and the date and time stamp of the message.
33 The ordered messages are then selected in order of
34 priority up to the available storage space but leaving
35 space for a system e-mail message to the client that
36 there are additional messages waiting for retrieval or
37 delivery.

38 A priority code of the present invention can be
39 included as part of the e-mail address itself by

1 comparing a number in the e-mail address itself to the
2 security code. For example, for jsmith@emailsys.com
3 having a security code of "124", an e-mail address such
4 as "jsmith_123@emailsys.com" would have a higher
5 priority than an e-mail address such as
6 "jsmith_456@emailsys.com" because the number "123" is
7 closer to the security code of "124" than the number
8 "456" is to "124". Thus, by having a single e-mail
9 address, the owner of the e-mail address can give out e-
10 mail addresses with different priority codes.

11

12 Client E-Mail Device - Software

13 The client's e-mail device has both a hardware
14 component as well as a software component. The e-mail
15 device can communicate with the local server, regional
16 server, main server, or another e-mail device (for peer-
17 to-peer communication).

18 Referring to Appendix A, the software pseudo-code
19 for the client's e-mail device is illustrated. When the
20 device is first turned on, a power-on self-test is
21 executed. If there is a fatal failure, the program flow
22 branches to the Fatal_Error_Stop label, sets the fatal
23 error indicator, and halts the system. If a minor
24 failure occurred, the program flow branches to the
25 Warning_Code label, sets a warning code indicator and
26 resumes the program flow. Next, the phone line status
27 is checked. If it is busy, the device will wait until
28 the line is not busy. The e-mail device is then placed
29 in auto-answer mode and the registers for the device are
30 initialized for operation. If there is any failure
31 during this initialization process, a warning code is
32 posted. After the initialization process, the software
33 continuously loops to check for an interrupt from the
34 interrupt registers. If an interrupt is found, the
35 program branches to the Interrupt_Service routine. The
36 Interrupt_Service routine reads the interrupt register,
37 determines the interrupt type, and branches to the
38 corresponding interrupt routine.

39 An interrupt may be caused by one of the several

1 subsystems, where the types of interrupts include
2 registration request interrupt, call-back mail delivery
3 interrupt, dial server interrupt (which calls the same
4 procedure as that of the call-back mail delivery
5 interrupt), incoming mail delivery interrupt, and
6 transfer-abort interrupt.

7 If the call-back interrupt flag is set, the call-
8 server routine is executed where the communication
9 module is set to dial the local server phone number and
10 execute an In-Mail routine.

11 The In-Mail routine first performs handshaking with
12 the local server communication module. It then sends
13 out any outgoing mail messages prepared by the client,
14 and requests and receives a confirmation signal from the
15 local server. If the confirmation signal from the local
16 server is incorrect, the outgoing mail messages are sent
17 again by branching the program flow to label SendM.
18 Otherwise, the device is instructed to receive incoming
19 mail messages. If the incoming mail messages are not
20 received correctly, a confirmation signal is generated
21 to sent to the local server which would cause the local
22 server to deliver the mail messages again. When the
23 messages are correctly received, the mail indicator is
24 set.

25 In the handshaking routine, the device receives the
26 security code from the local server, verifies the code,
27 and branches to the Bye routine if it is incorrect.
28 Similarly, the device receives the machine ID, verifies
29 the ID, and goes to the Bye routine if it is incorrect.
30 The device then sends the security code and the
31 available storage size to the local server.

32 Back to the Interrupt_Service routine, if the
33 Incoming-Mail interrupt flag is set, the program flow
34 branches to the In-Mail routine as described above.

35 If the Registration_Request interrupt flag is set,
36 this flag indicates that the client has placed the
37 device in registration mode in order to register with
38 the main server. This process is generally executed
39 when the device is being set up for the first time or

1 when the device has been moved to a new location. The
2 program flow branches to the Registration_Request
3 routine, where the device dials a designated phone
4 number for registration. Generally, this is a 800 toll
5 free number connected to the main server. When
6 connected, the device delivers the machine ID, the
7 security code, and the client's phone number to the main
8 server. The main server determines the particular local
9 server for serving the client's e-mail device based upon
10 the given phone number. The phone number for the
11 particular local server is sent to the client device,
12 and the client device retains the number in memory for
13 later use.

14 The dial_server interrupt flag is set by the client
15 to send and retrieve mail messages. Like the call_back
16 interrupt, it calls the call_server routine.

17 In the case where the local server is using the
18 direct mail delivery method, the Incoming-mail flag is
19 set and the In_Mail routine is executed as described
20 above.

21 In the case where a request has been made to
22 disconnect the line, the Transfer-Abort flag is set
23 which causes any phone connection to be disconnected.

24 In the case where the hardware for the e-mail
25 device is part of another computer system (e.g. personal
26 computer system) in the form of an expansion card or a
27 part of an expansion card, the interface with the e-mail
28 device can be integrated with a mail program of the
29 computer.

30

31 Client E-Mail Device - Hardware

32 The hardware component of the e-mail device may be
33 embodied in several different manners. In one form, the
34 e-mail device is a low-cost stand alone device directly
35 connected to the phone line before the phone line is
36 connected to other devices (e.g. answering machine, fax
37 machine, etc.). The stand-alone embodiment interacts
38 with the e-mail system as described above. More
39 particularly, the software for the e-mail device as

1 described above is configured and stored in the ROM of
2 the e-mail device.

3 In another hardware embodiment, the e-mail device
4 is an integral part of a computer expansion card having
5 power supplied from two sources, the computer system
6 itself or an external power supply. Referring to Fig.
7 18a, an expansion card 1050 having an edge connector
8 1052 is illustrated. The expansion card is insertable
9 into an edge connector slot connected to the bus of a
10 computer system. The expansion card includes a CPU 1054
11 (or microcontroller) directly polling an I/O register
12 1056 that is communicatively connected to a notification
13 module 1058. The I/O register 1056 receives information
14 from the notification module 1058 and the user input and
15 control device 1057 (which can be a keyboard, a keypad,
16 dip switches, etc.) for entering security code, e-mail
17 messages, or other inputs, and generates signals for
18 indicators 1059 to indicate the status of any messages
19 and the e-mail device. The notification module sends
20 and receives information via a phone line connection and
21 interacts with the communication module 1062. When the
22 expansion card is inserted into the computer system, a
23 bus controller 1064 controls the data flow to and from
24 the computer system (not shown) via the edge connectors
25 1052. Information is passed between the flash memory
26 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the
27 communication module 1062 through an internal bus 1072.
28 The communication module can be a fax/modem chipset.
29 The expansion card 50 may be powered by one of two
30 sources, power from the computer system via trace 1074
31 or power from an external source via trace 1076 and
32 power jack 1078. The power switching and conversion
33 module 1080 detects power from one of the two sources,
34 performs any power conversion from one voltage level to
35 another voltage level if it is needed, and routes the
36 power to the components on the expansion card 1050. The
37 power detection and switching is automatically performed
38 without interruption to the operation of the e-mail
39 device. Thus, no interruption of operation would occur

1 if power is switched in the midst of sending or
2 receiving e-mail messages.

3 In this embodiment, when the computer system is on,
4 the expansion card may be controlled and operated by the
5 software of the computer system. When the computer
6 system is off, unattended, or not controlled by the
7 software of the computer system, the expansion card
8 obtains its power supply from an external source and
9 operates in accordance with the software described
10 above.

11 Mailing program on the computer system having the
12 e-mail expansion card would have software routes for
13 sending and retrieving e-mail messages between the
14 computer system and the e-mail expansion card.
15 Referring to Fig. 18b, the pseudo-code for the computer
16 system to retrieve e-mail messages from the expansion
17 card is illustrated. The status of the card is first
18 verified. If the card is not busy, the in-mail message
19 flag (indicating the existence of new e-mail messages)
20 is checked. If there is a new message, the message is
21 transferred to the computer system and the storage area
22 is cleared. Then, the message is displayed on the
23 computer screen of the computer system. Referring to
24 Fig. 18c, the pseudo-code for the computer system to
25 transfer prepared e-mail messages to the expansion card
26 for outbound is illustrated. If the card status is not
27 busy and if there is enough storage space to store all
28 of the e-mail messages, the e-mail messages are
29 transferred to the expansion card and the computer can
30 be turned off. If the storage on the card is
31 insufficient, the user is informed to wait until the
32 messages are sent before turning the computer off.

33 In yet another hardware embodiment, referring to
34 Fig. 19a, the communication module of Fig. 18a is a
35 commonly available external fax/modem. For an external
36 modem, its serial port 1086 may be connected to the
37 serial port of the computer system. The expansion card
38 1082 (now without the communication module) communicates
39 with the modem 1084 through serial port 1086. The

1 notification device may be connected to the modem via
2 standard phone jacks and a phone line 1088. In this
3 embodiment, the cost of the expansion board now without
4 the communication module is reduced. A phone line
5 signal would come in on jack 1090 and be processed in
6 the same manner as described above.

7 Fig. 19b illustrates the embodiment for an internal
8 modem where the e-mail expansion card 1082 is mounted on
9 the mother board 1083 and has a phone jack 1092 for
10 receiving the phone line and phone signal and a phone
11 jack 1093 for passing the phone signal to the modem card
12 1094 via phone line 1097. The modem card 1094 is
13 mounted on the mother board 1083 as well and receives
14 the phone signal at phone jack 1095 and passes the phone
15 signal out at phone jack 1096. The e-mail expansion
16 card directly communicates with the modem card via
17 ribbon 1098. Ribbon 1098 on one end is communicatively
18 attached to the expansion card 1082 and on the other end
19 it can be a ribbon cable inserted into a bus connector
20 slot 1105 of the mother board along with the modem card.
21 Fig. 19c shows that the ribbon cable 1098 at the end
22 having three contact surfaces 1099, 1101, and 1103.
23 Contact surface 1103 makes electrical contacts with
24 selected tabs on one side 1107 of the edge connector of
25 the modem card 1094 and selected tabs on one side of the
26 bus slot 1105. Contact surface 1101 makes physical
27 contact (but no electrical contact) with the bottom of
28 the bus connector slot 1105. Contact surface 1099 makes
29 electrical contact with selected tabs on the other side
30 of the edge connector of the modem card 1094 and
31 selected tabs on one side of the bus slot 1105. In this
32 manner, the modem card can communicate with the computer
33 system and the e-mail expansion card, and the e-mail
34 expansion card is allowed a greater amount of direct
35 control over the modem card. In the case where power is
36 being supplied by an external source, the power can be
37 supplied to the modem card through certain of the
38 selected tabs.

39 Note that in both Figs. 19a and 19b, the e-mail

1 expansion card optionally can have complete control over
2 the external or internal fax/modem where all
3 communication between the CPU and the fax/modem has to
4 pass through the e-mail expansion card. In another
5 word, the e-mail expansion card can encapsulate the
6 fax/modem. In Fig. 19b, encapsulating can be achieved
7 by providing a ribbon cable having printed traces on one
8 side and non-conductive material on the other side. The
9 modem card nevertheless is inserted into the bus slot
10 but it does not communicate through the traces in the
11 bus slot. Conventional methods can be applied as well
12 where the e-mail expansion card and the internal modem
13 card are connected via simple ribbon and connectors on
14 each card.

15 In yet another embodiment of the invention,
16 referring to Fig. 19d, the e-mail device 1130 is a
17 stand-alone card having an slot connector 1144 able to
18 receive a regular fax/modem card 1132. The e-mail
19 device has a connector 1138 for receiving ac or dc power
20 supply, a communication port 1136 (such as a serial
21 port), and a phone jack for receiving a phone line 1134
22 and also a jack for passing a phone signal to another
23 device 1135. Likewise, the fax/modem card 1132 has a
24 jack for receiving a phone signal 1142 and a jack for
25 passing through a phone signal 1143. This embodiment
26 can be placed in a physical box.

27 Further note that although the e-mail device is
28 illustrated as an expansion card it can be easily
29 converted into an external device like that of the
30 common external fax/modem device. Moreover, the
31 expansion card can be converted to a stand alone device
32 with a display. Moreover, communication devices are not
33 limited to the fax/modem devices illustrated above.
34 ISDN devices, cable modem, wireless modem, or other
35 communication devices can be used as communication
36 devices as well.

37 The hardware embodiment for implementing the
38 ringing protocol described above requires a tone
39 detection circuit. Referring to Fig. 20, on the local

1 server side, the local server provides the dialing and
2 answering functionalities 1052 through the use of a
3 modem 1057 or other communication devices or modules.
4 The modem controls the phone line 1055 to dial the
5 telephone number of the client's e-mail device, and the
6 tone detection circuit 1053 detects the ringing tone and
7 reports it to the local server 1056. The local server
8 determines the length of ringing time and instructs the
9 modem to disconnect when the predetermined period of
10 time has been reached.

11 On the client e-mail device end, the notification
12 device 1054 detects the ringing signal, the time lapsed
13 for each ringing signal and the time lapsed between the
14 signals. It then determines whether a valid
15 notification code has been received. Referring to Fig.
16 21, on the client side, the microcontroller 1058
17 operates a ringing signal detection circuit 1049 and a
18 modem 1047 in detecting whether a valid ringing code has
19 been received.

20

21 Integration of the E-Mail Device

22 The above described e-mail device may be integrated
23 into other devices. For example, the e-mail device may
24 be part of a phone, a fax machine, an answering machine,
25 etc. If the e-mail device is integrated with a fax
26 machine, e-mail messages can be readily printed out and
27 any outgoing mail messages may be composed through the
28 use of the numeric keypad. Fig. 22 illustrates one
29 embodiment of the e-mail device integrated with a fax
30 machine. In this embodiment, there is a transmitter
31 subsystem 1100, a receiver subsystem 1102, and a modem
32 1104 that can be connected to a telephone line 1106.
33 The modem incorporates a control module 1125 to execute
34 the ringing protocol described above and distinguishes a
35 fax/modem signal from an e-mail message signal (or
36 protocol) to activate the corresponding portion of the
37 circuitries.

38 The transmitter 1100 can process two signals, one
39 signal for faxing and one signal for mailing messages.

1 For faxing a document, the document is first scanned by
2 a scanner 1108 and the scanned signal is converted to a
3 digital format 1110. For mailing messages, the prepared
4 mail messages are stored in memory 1114 and converted to
5 raster graphic image 1126. Note that a number of
6 methods are available for composing mail messages,
7 including the use of a keyboard, a keypad, etc. The
8 composed messages are then stored in memory. A
9 multiplexer 1116 selects one of the two signals to pass
10 through to the compressor 1112 and then to the modem
11 1104 for transmission in accordance with the selected
12 mode.

13 The receiver subsystem 1102 processes incoming fax
14 signal or mail message signal. For a fax signal, the
15 signal is decompressed 1118 and sent to the printing
16 subsystem 1122 through a multiplexer 1120. For an e-
17 mail message signal, the signal is received and
18 processed by an integrated e-mail device (and software)
19 1124 as described above. The output from the e-mail
20 device is converted to image format 1126 and sent to the
21 printing subsystem 1122 via the multiplexer 1120.
22 Again, the multiplexer selects the signal to be sent to
23 the printing subsystem in accordance with the selected
24 mode.

25

26 REMOTE CONTROL OF THE SERVERS

27 The servers can be remotely operated and control by
28 using commercially available communication software or
29 tailored software. The ringing protocol may be used to
30 set and reset the servers. Appendix B illustrates one
31 set of pseudo-code for remote controlling the servers.
32 Referring to Fig. 23, the server computer 1210 is
33 connected to the network 1200 via a direct connection
34 1214 and through a modem 1212. The modem provides a
35 remote login path to the server in order to control or
36 maintain the server. If the server does not respond to
37 the remote login, the ringing protocol of the present
38 invention embodied in the notification device 1205 can
39 be used to detect ringing pattern. Upon receiving a

1 proper ringing pattern, the notification device sends a
2 signal to the server computer via line 1207 to prepare
3 for shut-down and a signal to the power control module
4 1206 to generate a pulse to toggle the relay 1202 for a
5 proper period of time to reboot the computer.

6 The software described herein for implementation of
7 the e-mail system can be written specifically for this
8 particular application in the programming language of
9 choice. It can also be implemented through the use of
10 existing system mail utility programs. For example,
11 under the Unix system, an entire set of mail utility
12 programs are available for the sending and receiving of
13 mail messages.

14 Although the present invention has been described
15 in terms of the presently preferred and second
16 embodiments, it is to be understood that such disclosure
17 including combinations of the two embodiments is not to
18 be interpreted as limiting. Various alterations and
19 modifications including the various combinations of the
20 two embodiments will no doubt become apparent to those
21 skilled in the art after reading the above disclosure.
22 Accordingly, it is intended that the appended claims be
23 interpreted as covering all alterations and
24 modifications as fall within the true spirit and scope
25 of the invention.

Client software codes on communication card or on a
stand alone system

Kernel

POST (Power on self-test)

If fatal failure, go to Fatal_Error_Stop

If minor failure, go to Warning_code

Check line status; if busy, wait until line is not
busy;

Set up communication module in auto-answer mode

Set up other I/O registers, devices

If any failure, go to Warning_code

loop Polling interrupt

If interrupt found, jump to Interrupt_service

go to loop

Fatal_Error_Stop:

set error indicator or display

Holt

Warning_code: (input: warning code)

set warning indicator (or display)

return

Interrupt_Service:

Read interrupt register

Check the interrupt type

case of:

Call_back: jump to Call_server

Registration request: jump to Reg_req

Incoming_mail: jump to In_mail

Dial_server: jump to Call_server

Transfer_abort: jump to Tfr_abort

end case:

Clear the interrupt that has been serviced

return

Call_server:

set up communication module to dial

read_server_number

dial (phone)

In_mail;

return

Bye:

hangup

set up communication module in auto answer mode

return

In_mail:

Handshaking

sendM send outgoing mail

receive transfer confirm info.

If confirmation info not correct, go to sendM

to retry

send available storage size

revM receive incoming mail

send receive confirmation info

```
If confirmation info is not correct go to revM
set Mail_in indicator
return
```

Handshaking:

```
check the security code, if not correct, go to Bye
receive machine ID from server (if it is used)
check the machine ID, if not correct, go to Bye
return
```

Reg_req:

```
dial the (800) number
establish connection
display greeting
send machine ID
send security codes
echo the security code
print "enter your phone number"
read phone_number
send phone_number
receive and save local server number(s)
print "registration done"
return
```

Tfr_abort:

```
save all data for immediate disconnection
hangup
return
```

APPENDIX B

Remote monitor and control of the local server

{ Codes for every local server }

Program diag_report;

begin

Do the following every hour

begin

run_diagnostics_and log results

check any problem

mail the report to the main server

end

end

{ Codes on main server }

Program remote_monitor;

begin

Do the following for every hour

begin

get_new_mail: //the mail are diag report from
local server

if there is mail

begin

check the report from each local server

if there is a problem

begin

remote_dia_ctrl: //reference point

rlogin local server //remote login & run

diag.

if rlogin fail goto cold_boot

run more extensive diagnostics

if the problem is correctable correct the

program

else reboot //(software warmboot)

begin

wait for reboot;

rlgin local server

if rlogin fail goto cold_boot

if system is okay, exit

else

begin

cold_boot:

remote_shutdown_process (n,m);

//hardware cold boot

// n,m are the secret code like
notification device

wait for reboot

rlgin local server

if system is okay, exit

else report problem to operator

end

end

else

if it is too long for not receiving mail

begin

rlogin the local server

```
        go to remote_dia_contrl
      end
    end
  end
```

{ The remote shutdown process uses a method similar to the notification device, but it requires much higher security in order to prevent unauthorized shutdown. So, the following procedure uses two codes instead of one code. Again the code represents the ring tone length difference for two consecutive dialings. The first code n is for the difference between the ringing period of the first call x1 and the second call x2, and m is for the difference between x2 and the ringing period of the third call x3. Typically, n and m are small numbers which can be positive or negative numbers. More codes can be used to achieve even greater security.}

```
process remote_shutdown_process (n,m);
begin
  start_point;    //just a reference point
  call (phone_number)
    if line busy, wait and go to start_point
  detect_ring_tone for x1 second
  disconnect;
  wait w1 seconds;
  call (phone_number);
    if line busy, wait and go to start_point
  detect_ring_tone for x2 second    //x2=x1+n
  disconnect
  wait w1 seconds;
  call (phone_number);
    if line busy, wait and go to start_point
  detect_ring_tone for x3 seconds    //x3=x2+m
  disconnect;
end
```

CLAIMS

I claim:

- 1 1. A telephonic electronic message apparatus for
2 automatically receiving electronic messages comprising:
3 a means for adapting to an existing telephone line
4 for receiving said electronic messages; and
5 a processing means for automatically responding to
6 said electronic messages and for storing said messages
7 therein whereby said electronic messages may be received
8 and stored without requiring a human operation.
- 1 2. The telephonic apparatus of claim 1 further
2 comprising:
3 an user interface means for providing information
4 to an user relating to a reception of said electronic
5 messages.
- 1 3. The telephonic apparatus of claim 2 further
2 comprising:
3 a telephone adapting means for connecting to a
4 telephone;
5 said processing means further including a telephone
6 interface means for detecting an incoming signal
7 received from said telephone line and for determining if
8 said incoming signal being an electronic message and for
9 transmitting said incoming signal to said telephone when
10 said incoming signal being detected is determined not an
11 electronic message.
- 1 4. The telephonic apparatus of claim 2 wherein:
2 said user interface means further including a
3 display means for displaying a message relating to the
4 reception of said electronic messages.
- 1 5. The telephonic apparatus of claim 2 wherein:
2 said processing means further including a message
3 storage means for storing said electronic messages
4 therein.

- 1 6. The telephonic apparatus of claim 3 further
2 comprising:
3 an electronic message exporting means for
4 delivering said electronic messages via a transmitting
5 means to a receiving device.
- 1 7. The telephonic apparatus of claim 6 wherein:
2 said electronic message exporting means including a
3 television interface means for delivering said
4 electronic messages via said transmitting means to
5 a television for displaying said electronic
6 messages thereon.
- 1 8. The telephonic apparatus of claim 7 wherein:
2 said user interface means further including an
3 message exporting control means for controlling a
4 display of said electronic message on said television.
- 1 9. The telephonic apparatus of claim 3 further
2 comprising:
3 an automatic registration means for storing
4 required registration data therein and for automatically
5 dialing and registering with a network server for
6 receiving said electronic messages therefrom.
- 1 10. The telephonic apparatus of claim 3 further
2 comprising:
3 a removable data storage means for storing said
4 electronic messages therein for removably transferring
5 said electronic messages therefrom.
- 1 11. The telephonic apparatus of claim 5 further
2 comprising:
3 a message full means for terminating a reception of
4 said electronic messages when said message storage means
5 reaching a full storage capacity.
- 1 12. The telephonic apparatus of claim 3 further
2 comprising:

1 a message screen means for detecting designated
2 message identifications in said electronic messages for
3 receiving and storing said electronic messages with said
4 designated message identifications.

1 13. The telephonic apparatus of claim 3 further
2 comprising:

3 an automatic logon means for automatically dialing
4 and logging on a network server periodically for
5 receiving said electronic messages therefrom.

1 14. The telephone apparatus of claim 4 wherein:
2 said user interface means further including a
3 display control means including control buttons for
4 controlling the display of different electronic
5 messages.

1 15. A telephonic electronic message apparatus for
2 automatically receiving electronic messages comprising:
3 a means for adapting to an existing telephone line
4 for receiving electronic messages including digitized
5 signals therefrom;

6 a processing means for automatically responding to
7 said electronic messages wherein said processing means
8 further including a message storage means for storing
9 said electronic messages therein;

10 an user interface means including a display means
11 for displaying information to an user relating to a
12 reception of said electronic messages, said user
13 interface control means further including a display
14 control means including control buttons for controlling
15 the display of different electronic messages;

16 a telephone adapting means for connecting to a
17 telephone;

18 said processing means further including a telephone
19 interface means for detecting an incoming signal
20 received from said telephone line and for determining if
21 said incoming signal being an electronic message and for
22 transmitting said incoming signal to said telephone when

1 said incoming signal being detected is determined not an
2 electronic message;

3 an electronic message exporting means for
4 delivering said electronic messages via a transmitting
5 means to a receiving device wherein said electronic
6 message exporting means including a television interface
7 means for delivering said electronic messages via said
8 transmitting means to a television for displaying said
9 electronic messages thereon;

10 said user interface means further including an
11 message exporting control means for controlling a
12 display of said electronic message on said television;

13 an automatic registration means for storing
14 required registration data therein and for automatically
15 dialing and registering with a network server for
16 receiving said electronic messages therefrom; and

17 a message full means for terminating a reception of
18 said electronic messages when said message storage means
19 reaching a full storage capacity.

1 16. The telephonic apparatus of claim 15 further
2 comprising:

3 a message screen means for detecting designated
4 message identifications in said electronic messages for
5 receiving and storing said electronic messages with said
6 designated message identifications.

1 17. The telephonic apparatus of claim 16 further
2 comprising:

3 a removable data storage means for storing said
4 electronic messages therein for removably transferring
5 said electronic messages therefrom.

1 18. The telephonic apparatus of claim 15 further
2 comprising:

3 an automatic logon means for automatically dialing
4 and logging on a network server periodically for
5 receiving said electronic messages therefrom.

1 19. The telephonic apparatus of claim 15 wherein:
2 said telephonic apparatus being provided for
3 receiving a plurality of message units; and
4 said user interface means including a message unit
5 access Control means for controlling an access to each
6 of said plurality of message units.

1 20. A method for providing communication between a
2 local electronic message server and a telephone user
3 connected with telephone line to the server comprising
4 the steps of:
5 (a) providing a telephonic electronic message
6 apparatus (which including a means for adapting]
7 adaptable to said telephone line for receiving
8 electronic messages from said local server; and
9 (b) providing a processing means for said
10 telephonic electronic message apparatus for
11 automatically receiving electronic messages for storing
12 said messages therein whereby said electronic messages
13 may be received and stored without requiring a human
14 operation.

1 21. An electronic message communication system
2 comprising:
3 a local electronic message server connected to an
4 internet system for receiving said electronic messages
5 therefrom and sending said electronic messages thereto;
6 a telephonic electronic message apparatus connected
7 to said local electronic message server by a telephone
8 line wherein said telephonic electronic message
9 apparatus includes a means for adapting to said
10 telephone line; and
11 said telephonic electronic message apparatus
12 further includes a processing means for automatically
13 receiving said electronic messages transmitting from
14 said local server through said telephone line for
15 storing said messages in said telephonic electronic
16 message apparatus whereby said electronic messages may
17 be received and stored without requiring a human

1 operation.

1 22. The electronic message communication system of
2 claim 21 wherein:

3 said telephonic electronic message apparatus
4 includes a registration trigger means and an automatic
5 registration dial-up means for automatically sending a
6 plurality of identification messages to said local
7 server for registration upon an actuation of said
8 registration trigger means; and

9 said local electronic message server includes a
10 registration processing means for receiving said
11 plurality of identification messages for processing a
12 registration Of said telephonic electronic message
13 apparatus in said local server.

1 23. The electronic message communication system of
2 claim 21 wherein:

3 said telephonic electronic message apparatus
4 includes an auto collect triggering means and an collect
5 dial-up means for automatically sending a plurality of
6 auto collect messages to said local server upon an
7 actuation of said auto collect trigger means; and

8 said local electronic message server includes an
9 auto collect processing means for receiving and
10 responding to said plurality of auto collect messages
11 for automatically sending a plurality of electronic
12 messages to said telephonic electronic message
13 apparatus.

1 24. The electronic message communication system of
2 claim 21 wherein:

3 said local electronic message server includes an
4 message priority processing means for checking a
5 priority of each of said electronic messages and for
6 sending each of said electronic messages to said
7 telephonic electronic message apparatus according to
8 said priority.

1 25. The electronic message communication system of
2 claim 21 wherein:

3 said local electronic message server includes a
4 storage capacity processing means for checking a storage
5 capacity of said telephonic electronic message apparatus
6 and for sending said electronic messages thereto
7 according to said storage capacity whereby a message
8 overflow of said telephonic electronic messages
9 apparatus may be prevented.

1 26. The electronic message communication system of
2 claim 22 wherein:

3 said automatic registration dial-up means provided
4 for automatically sending a plurality of said
5 identification messages including a telephone number, a
6 machine number and a user password.

1 27. A method for sending and receiving electronic mail
2 messages over an interconnected network of computers
3 where one of said interconnected computers is configured
4 to receive mail messages having a particular domain
5 address, said configured computer electronically
6 connected to one or more mail servers each designated
7 for a particular geographical region and each
8 electronically connected to one or more electronic mail
9 messaging devices each having a particular address
10 within said domain address for receiving electronic mail
11 messages addressed to said particular address, wherein
12 each of said devices contains dedicated electronic
13 circuitries for sending, receiving, and storing
14 electronic mail messages, said method comprising the
15 steps of:

16 receiving one or more electronic mail messages each
17 addressed to a particular address within said domain
18 address;

19 determining the mail server for delivering each of
20 the electronic mail messages in accordance to their
21 respective particular addresses;

22 packaging the electronic mail messages for a mail

1 server into a mailbag for delivery;
2 sending said mailbag to said mail server;
3 unpackaging said mailbag and reconstructing the
4 electronic mail messages from said mailbag at said mail
5 server; and
6 delivering each of the electronic mail messages to
7 the corresponding electronic mail messaging devices.

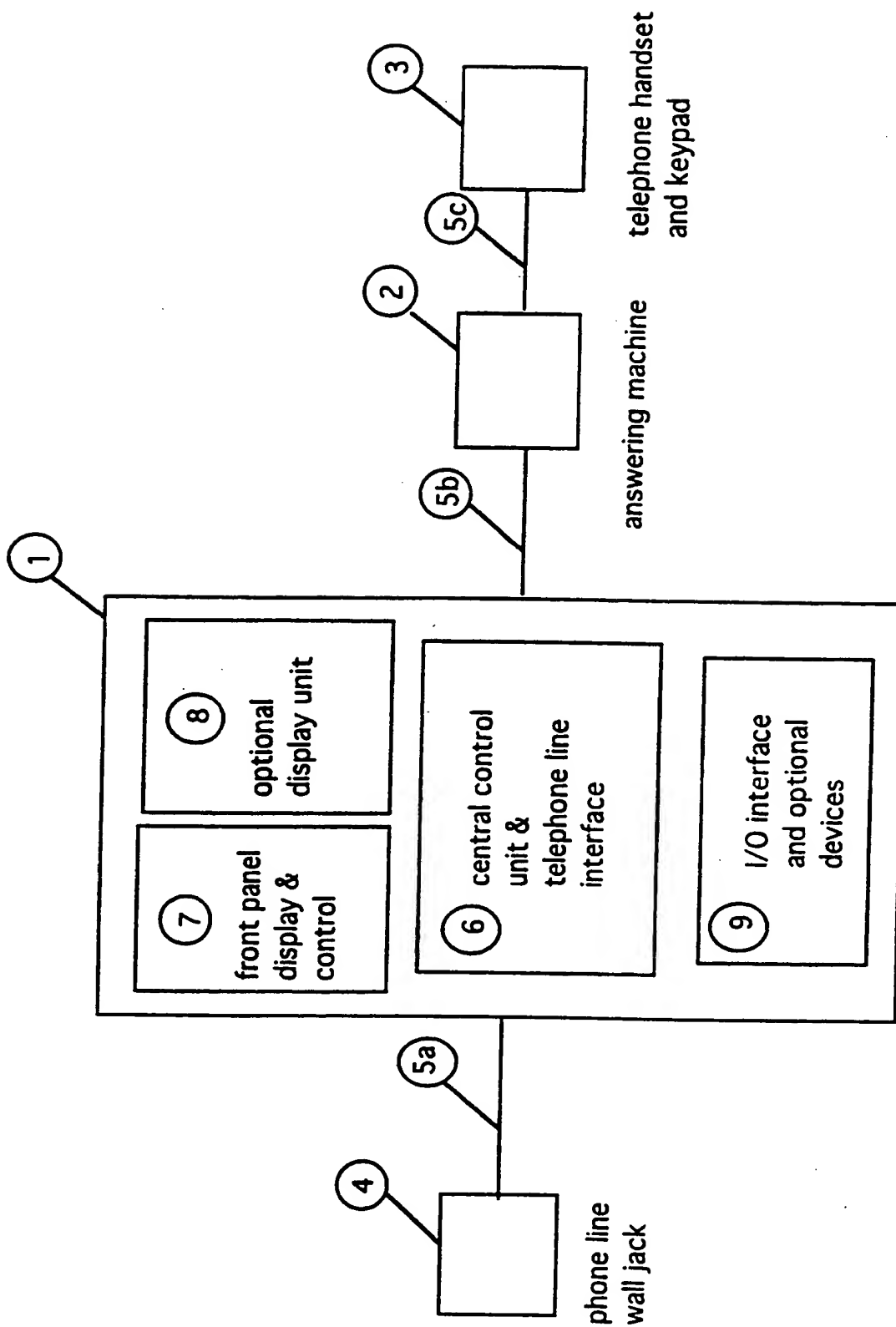


Fig. 1 connection of E-mail apparatus and telephone & answering machine

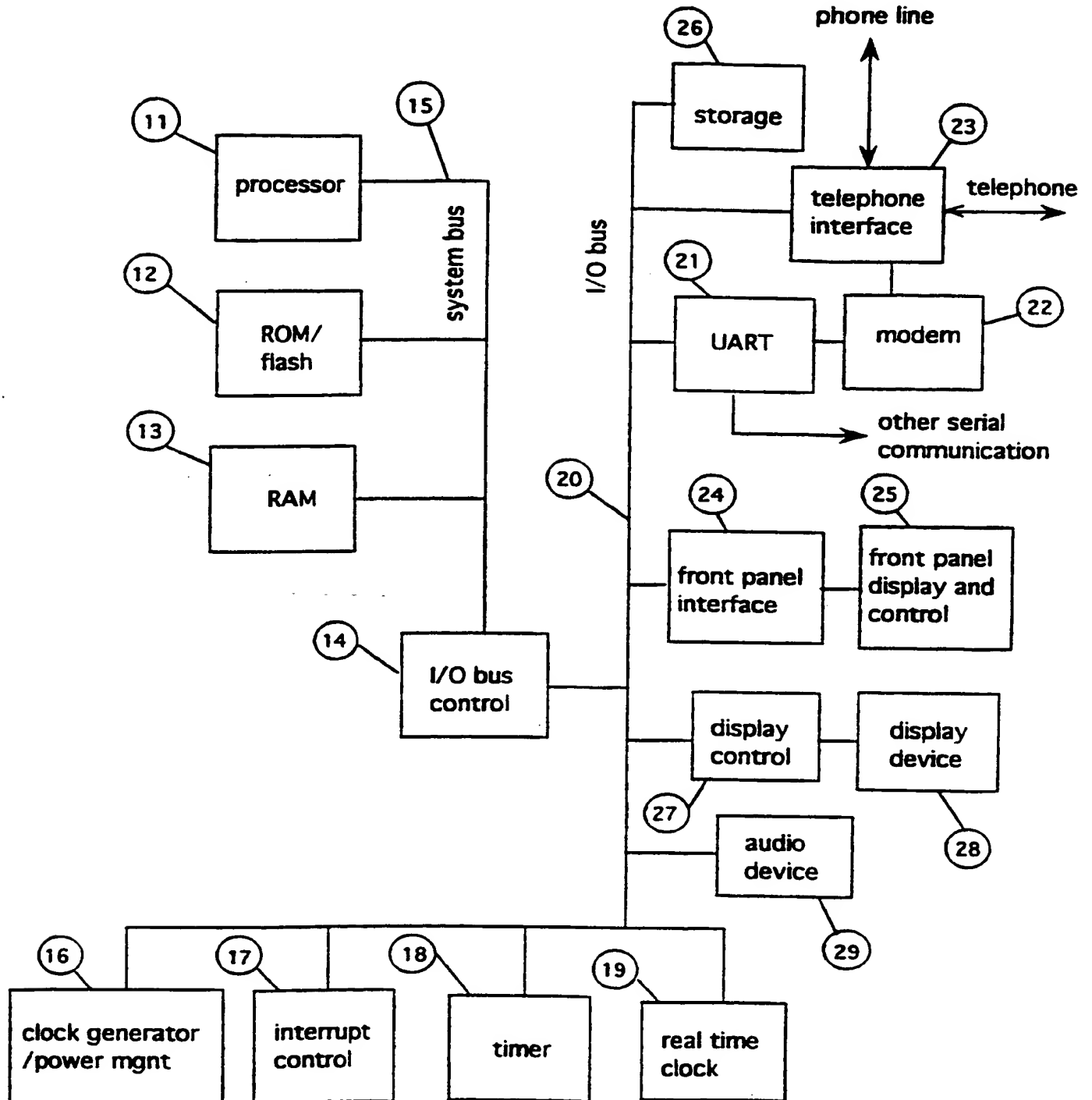


Fig 2. Block diagram of the E-mail apparatus

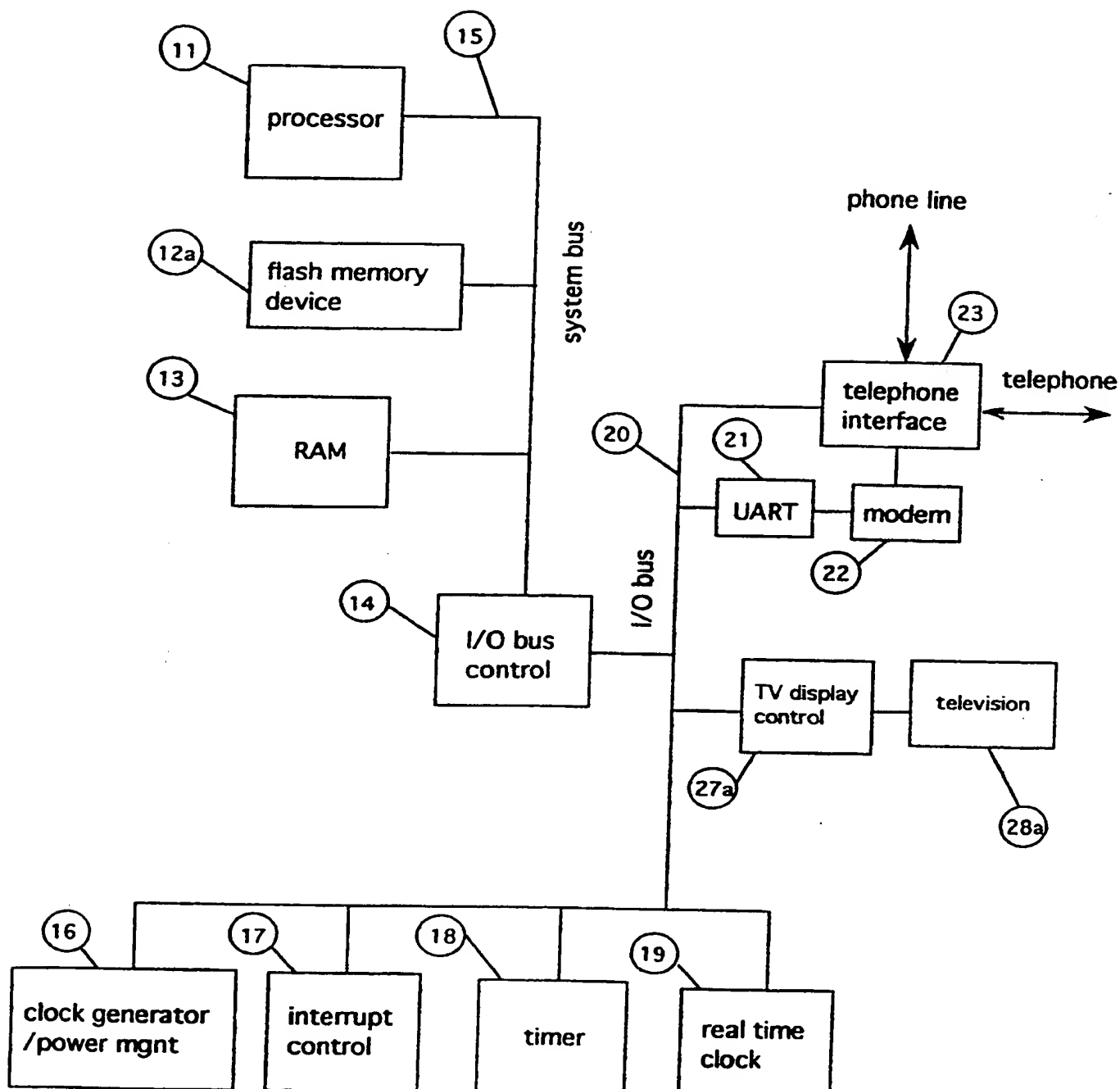


Fig 2a. Example of the E-mail apparatus implementaiton

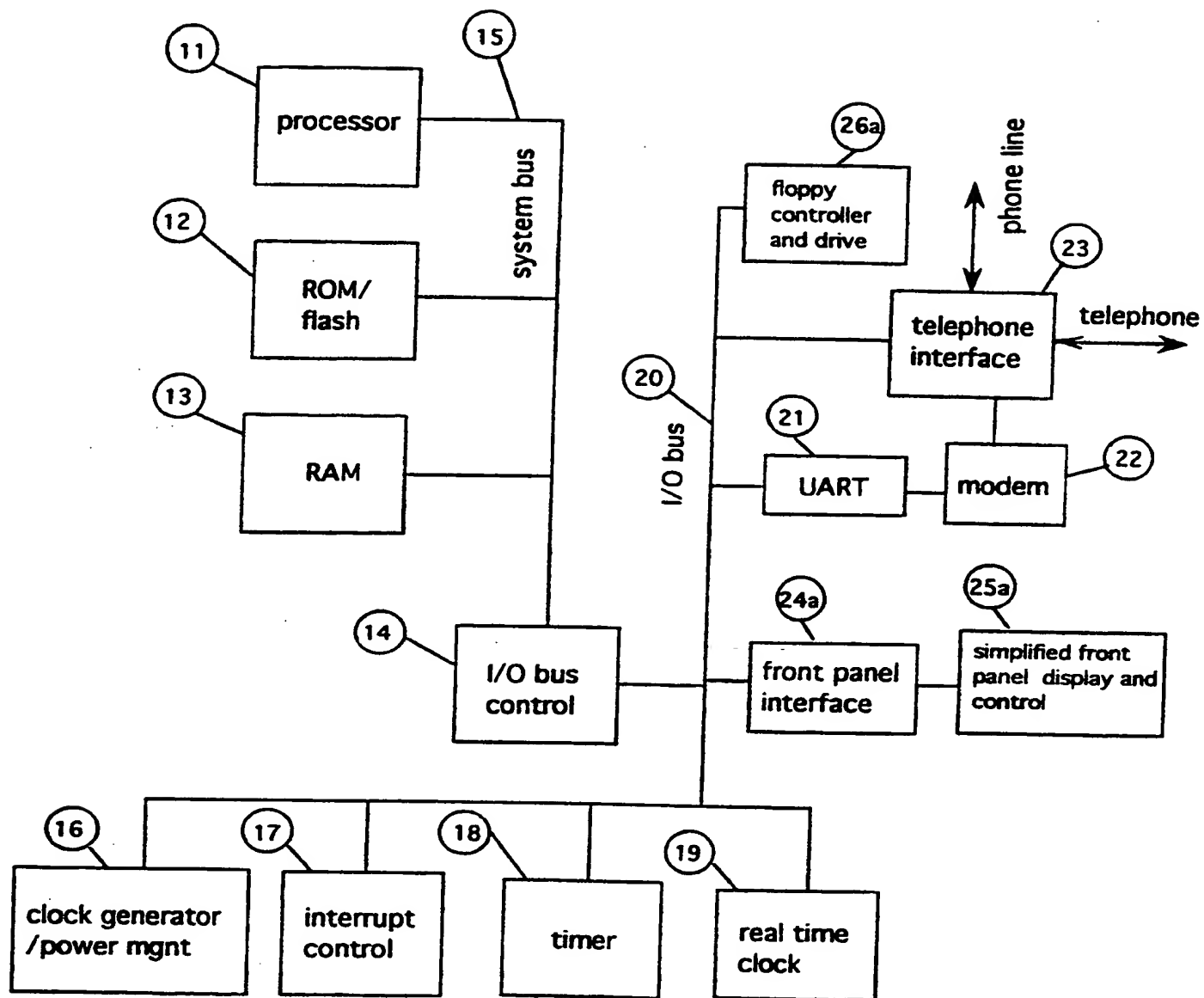


Fig 2b. Example of the E-mail apparatus implementation

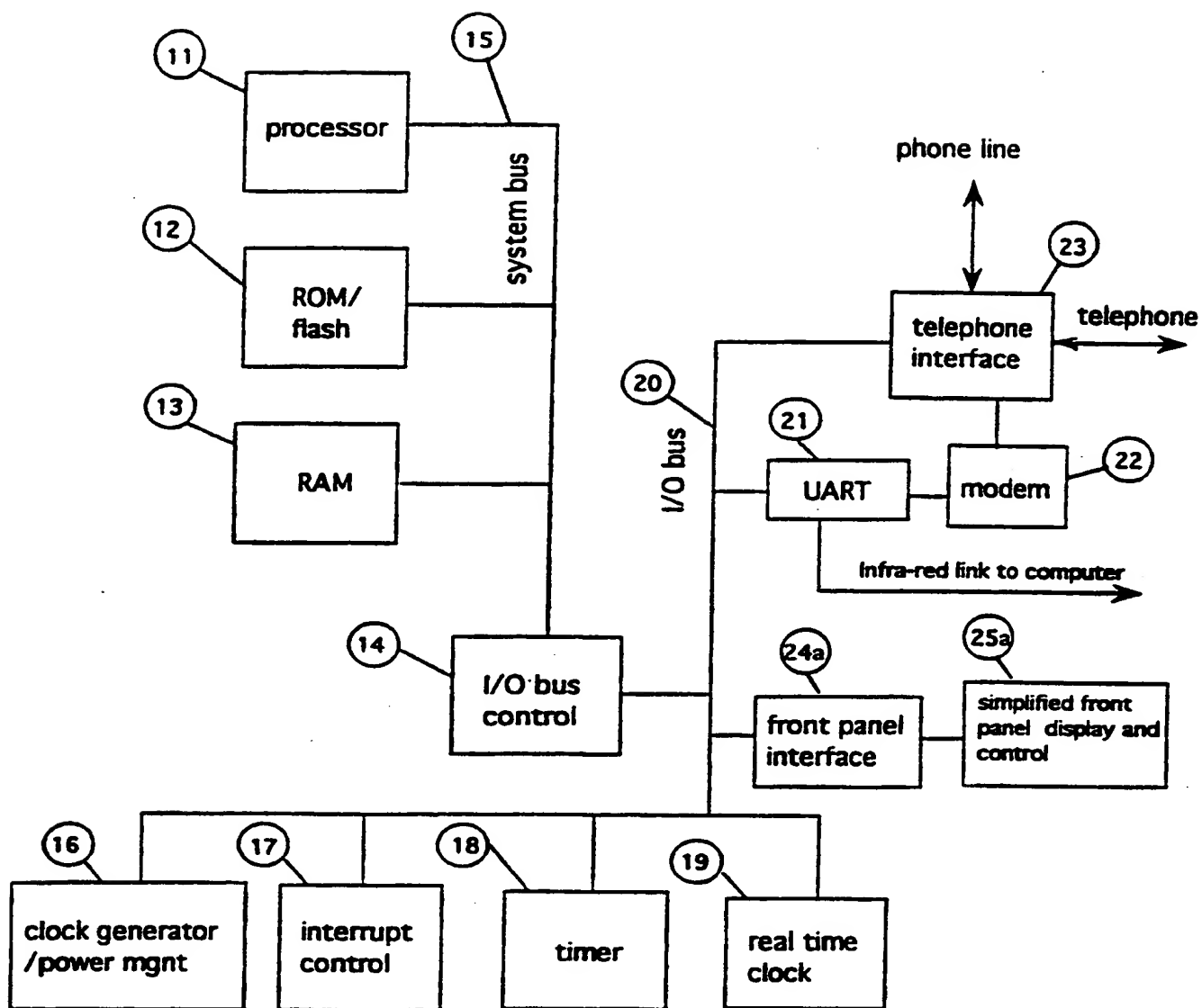


Fig 2c. Example of the E-mail apparatus implementation

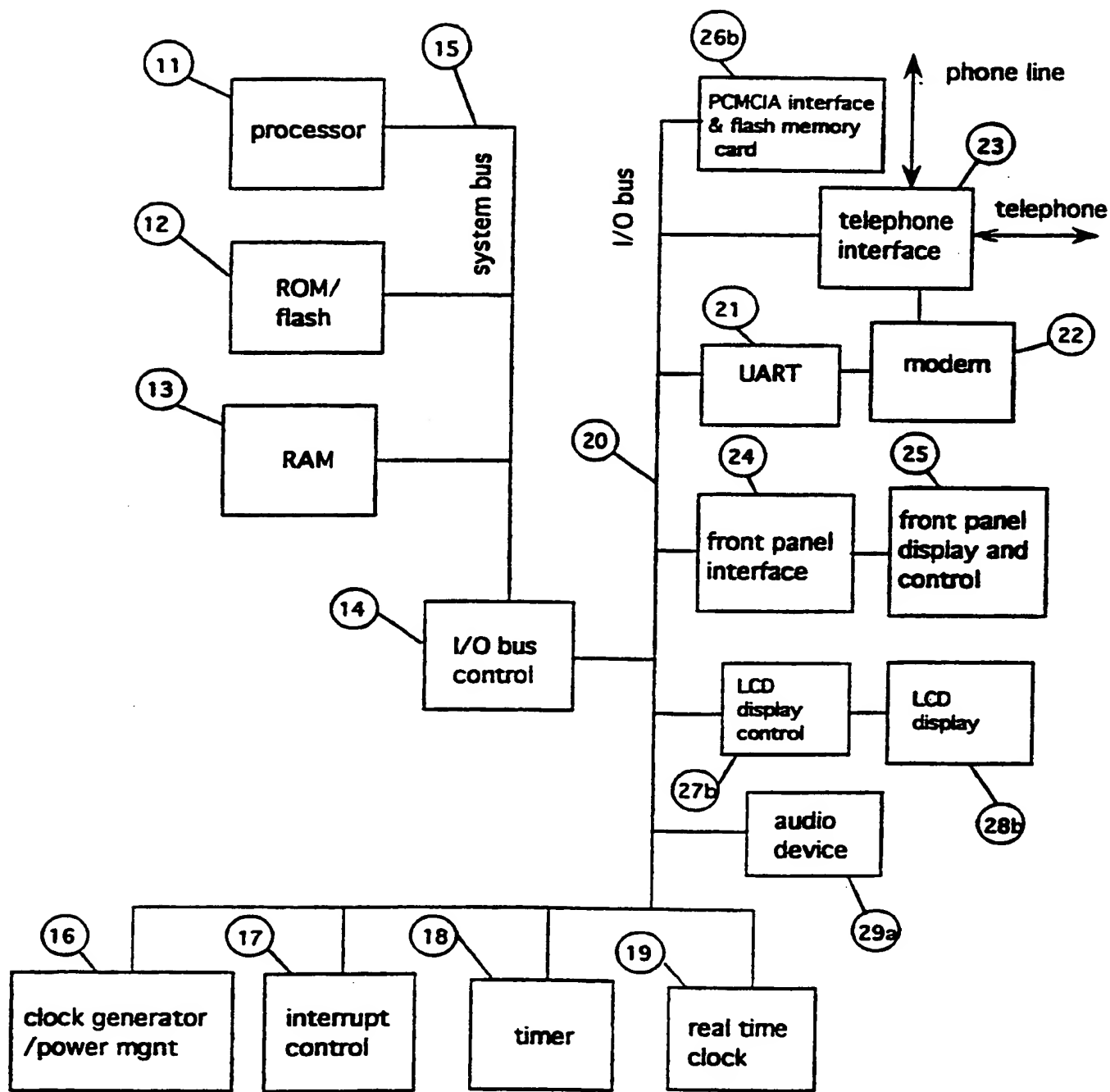


Fig 2d. Example of the E-mail apparatus implementation

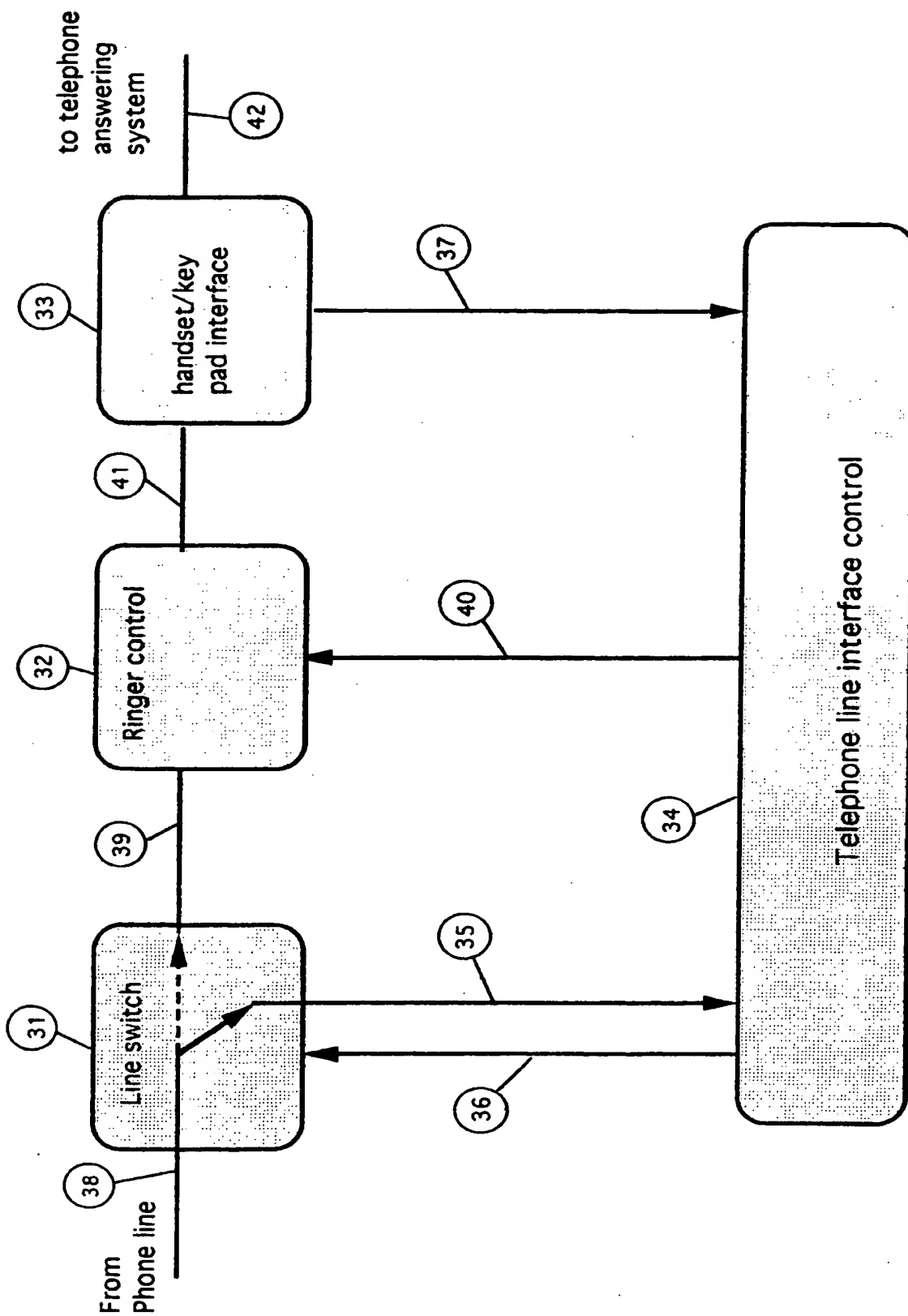


Fig. 3 Telephone interface block diagram

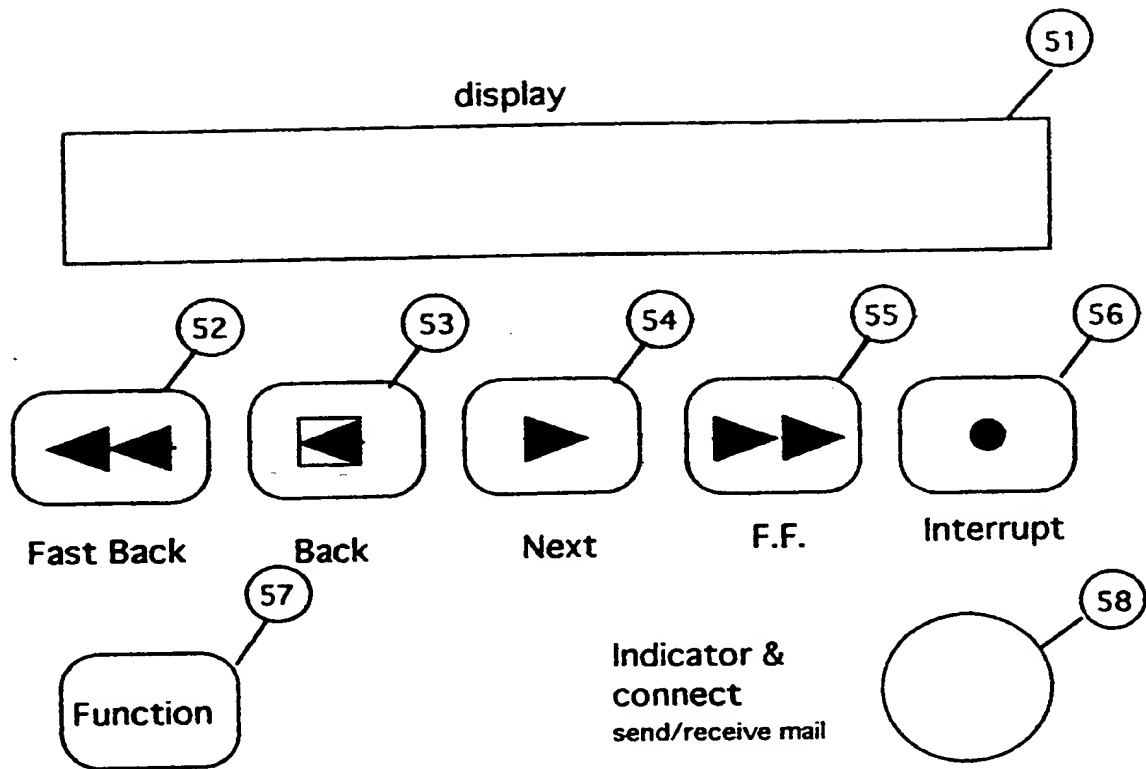


Figure 4: Front panel interface

Special functions

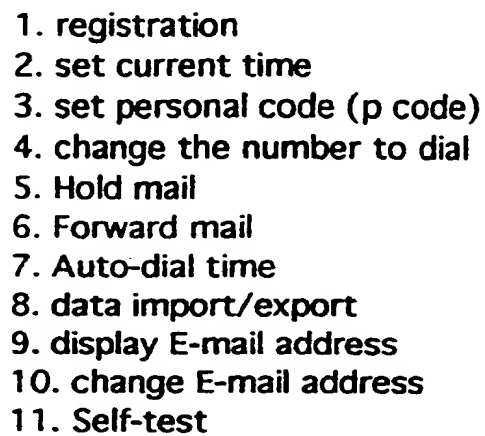
- 
1. registration
 2. set current time
 3. set personal code (p code)
 4. change the number to dial
 5. Hold mail
 6. Forward mail
 7. Auto-dial time
 8. data import/export
 9. display E-mail address
 10. change E-mail address
 11. Self-test

Figure 5: Example of special functions men.

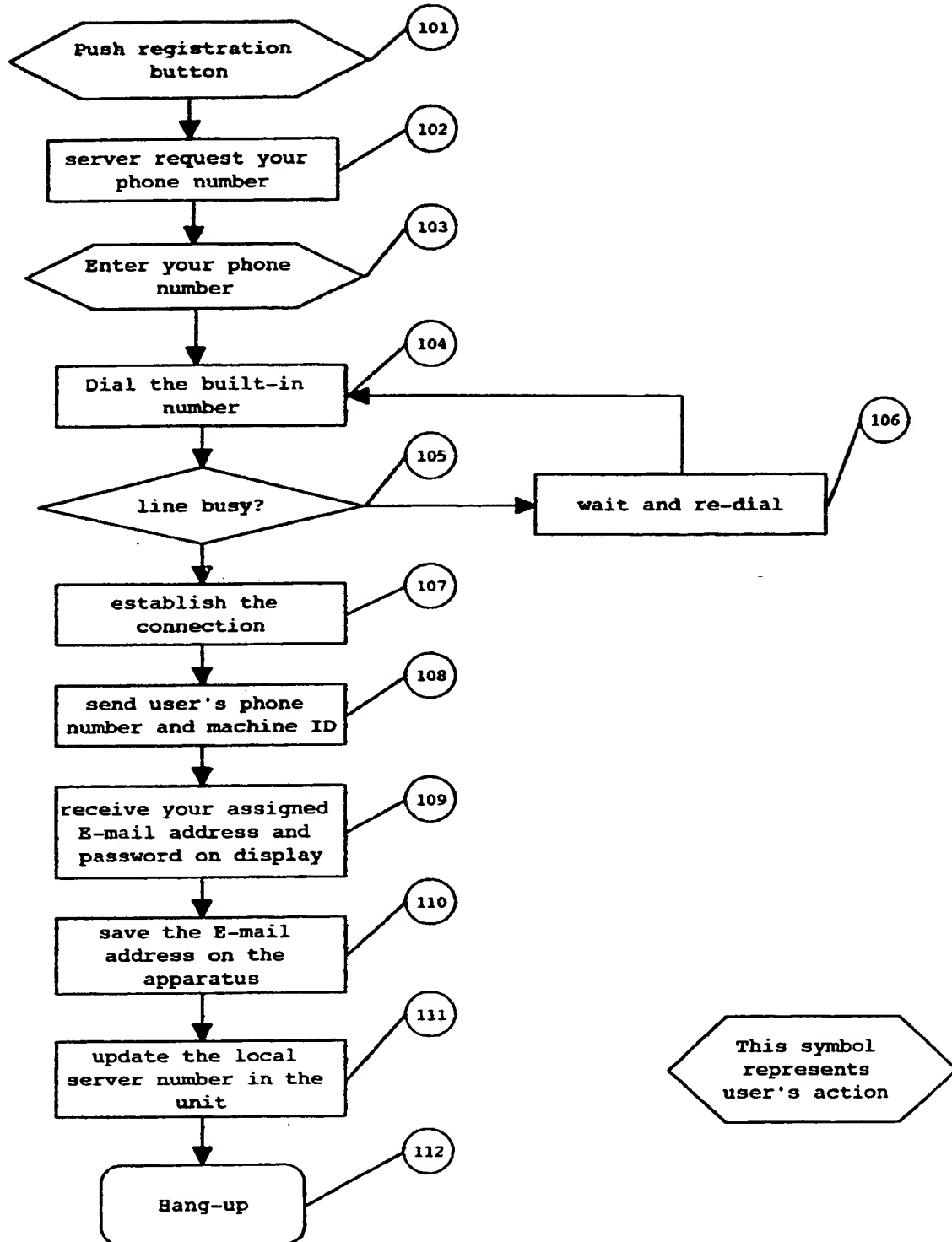


Figure 6: Easy registration flow

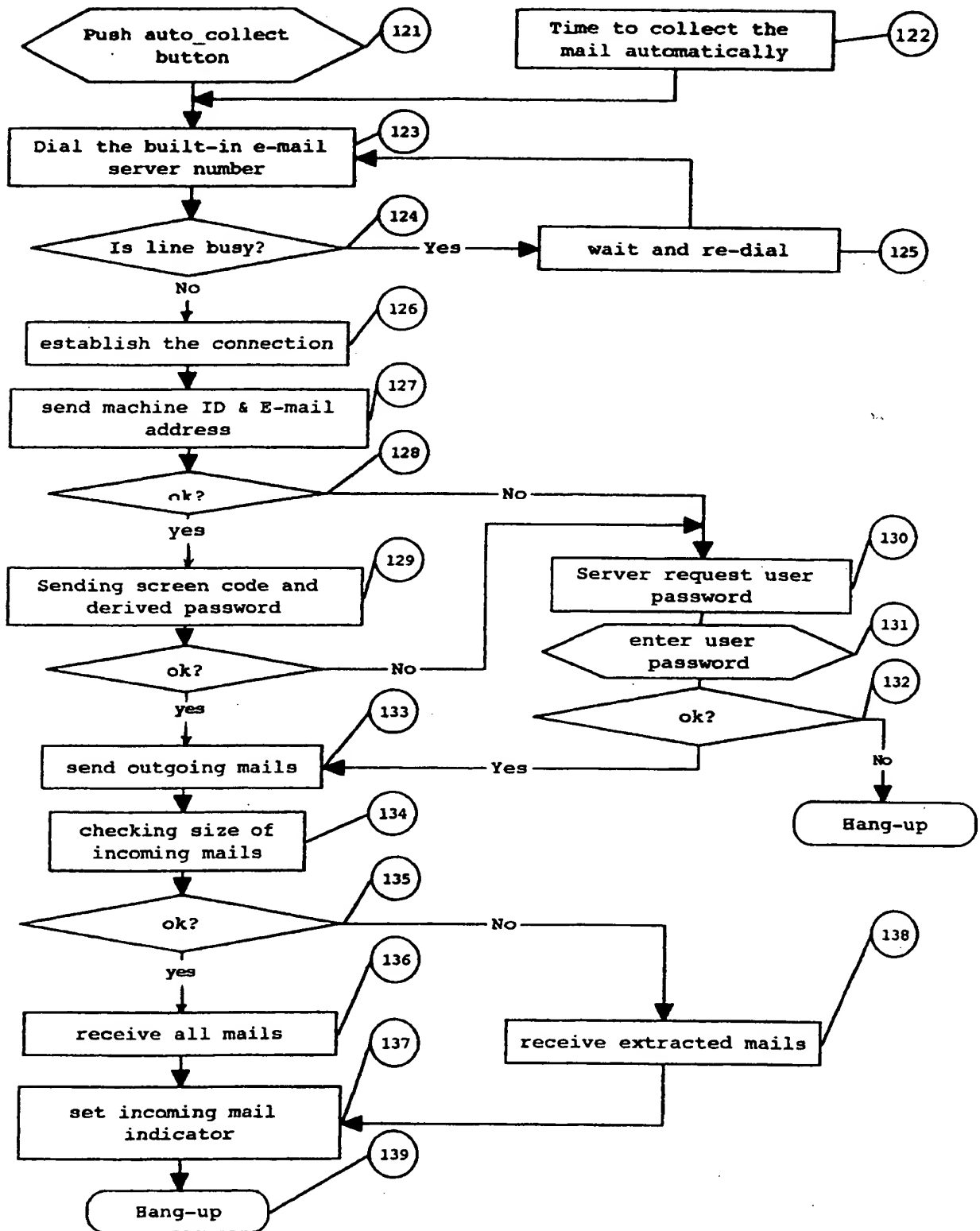


Figure 7: E-mail collect flow

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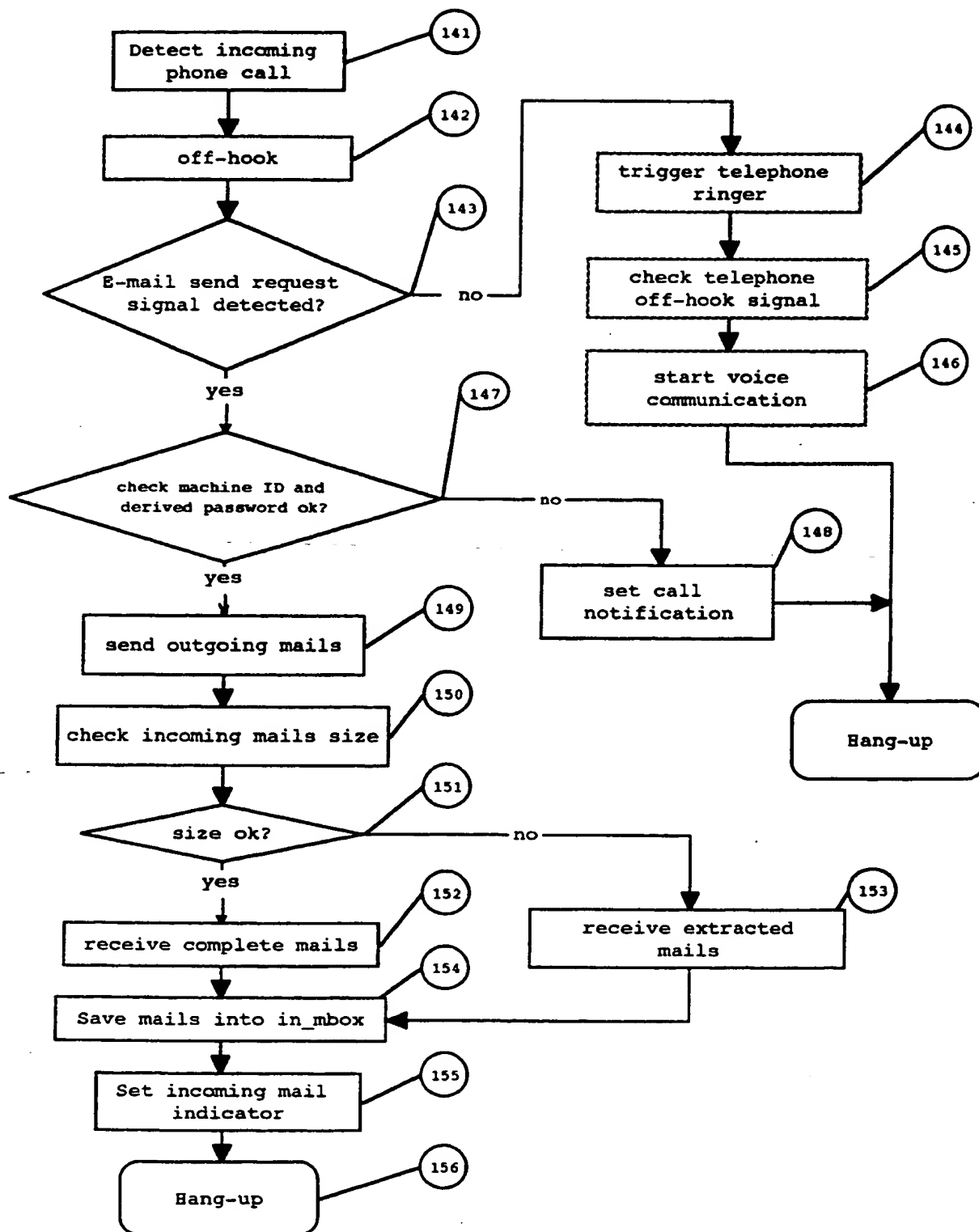


Figure 8: Apparatus's response to E-mail server delivery request

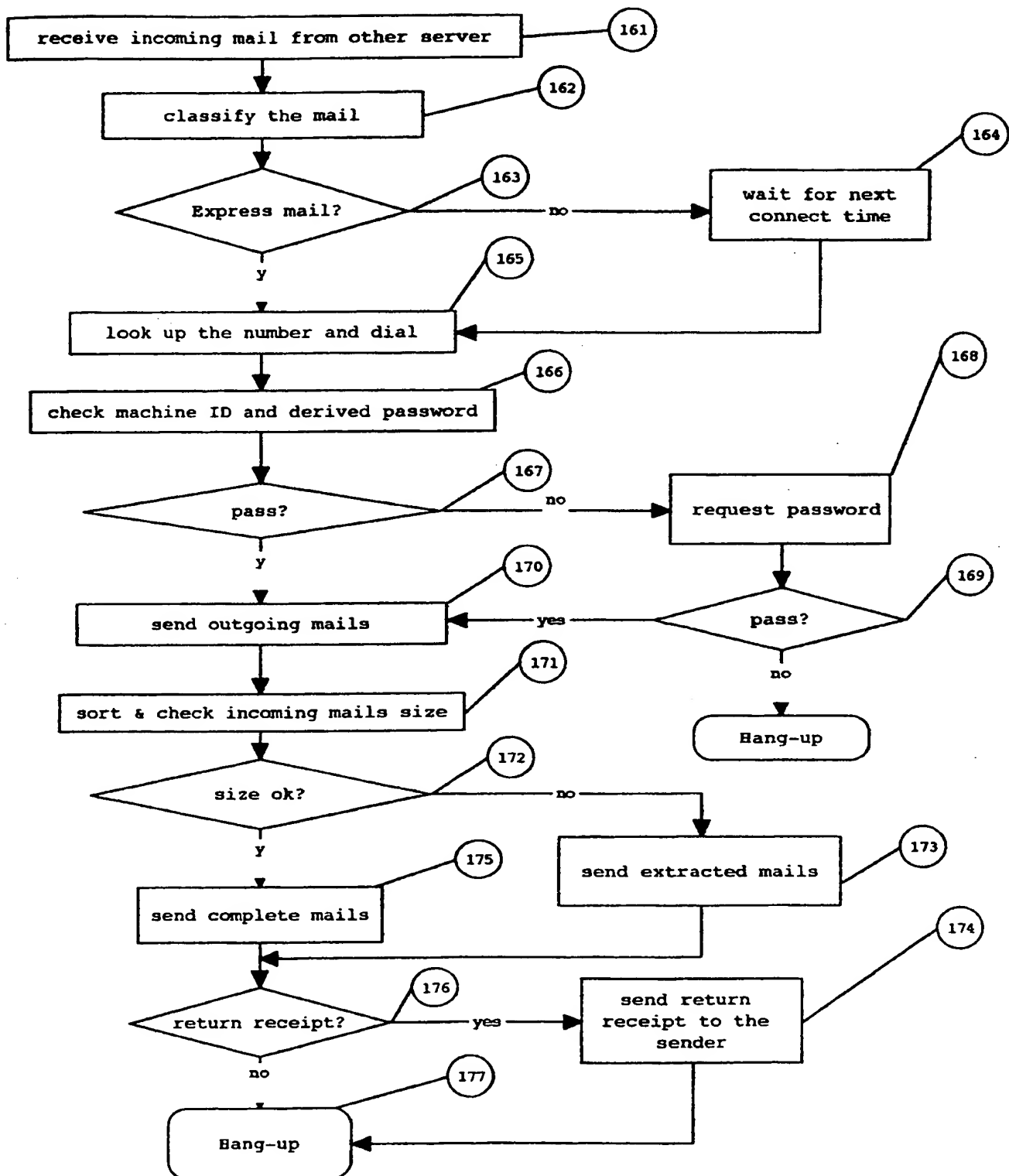


Figure 9:E-mail server mail process flow

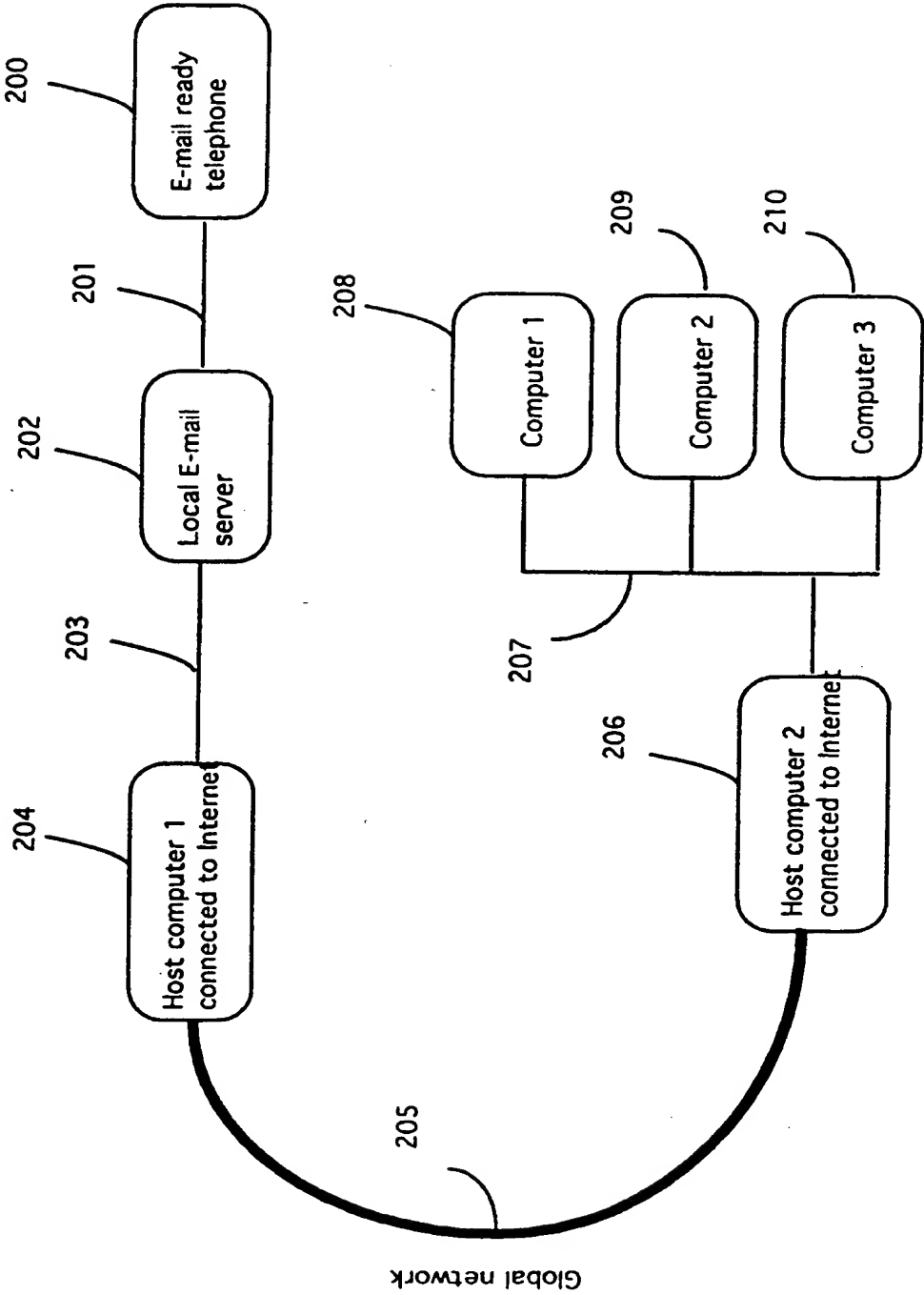


Fig. 10 Network connection diagram

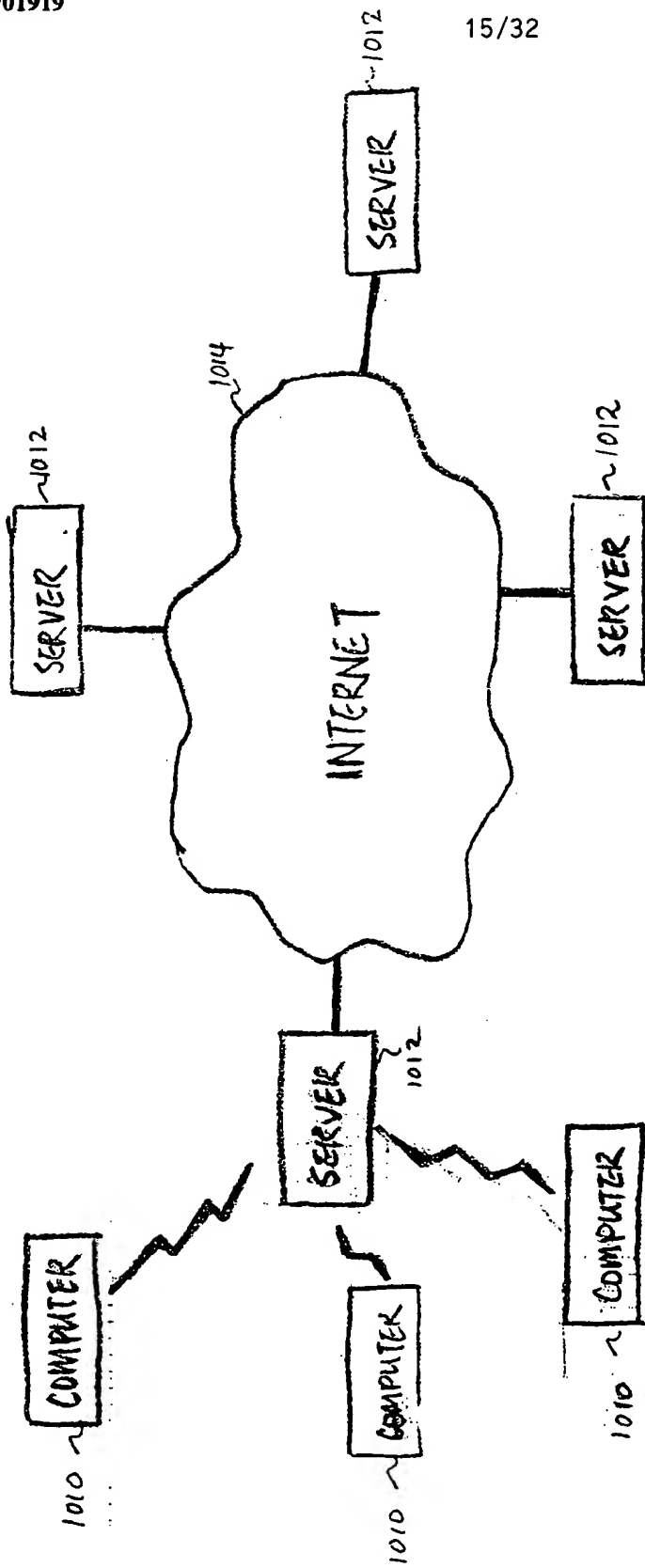


fig. 11

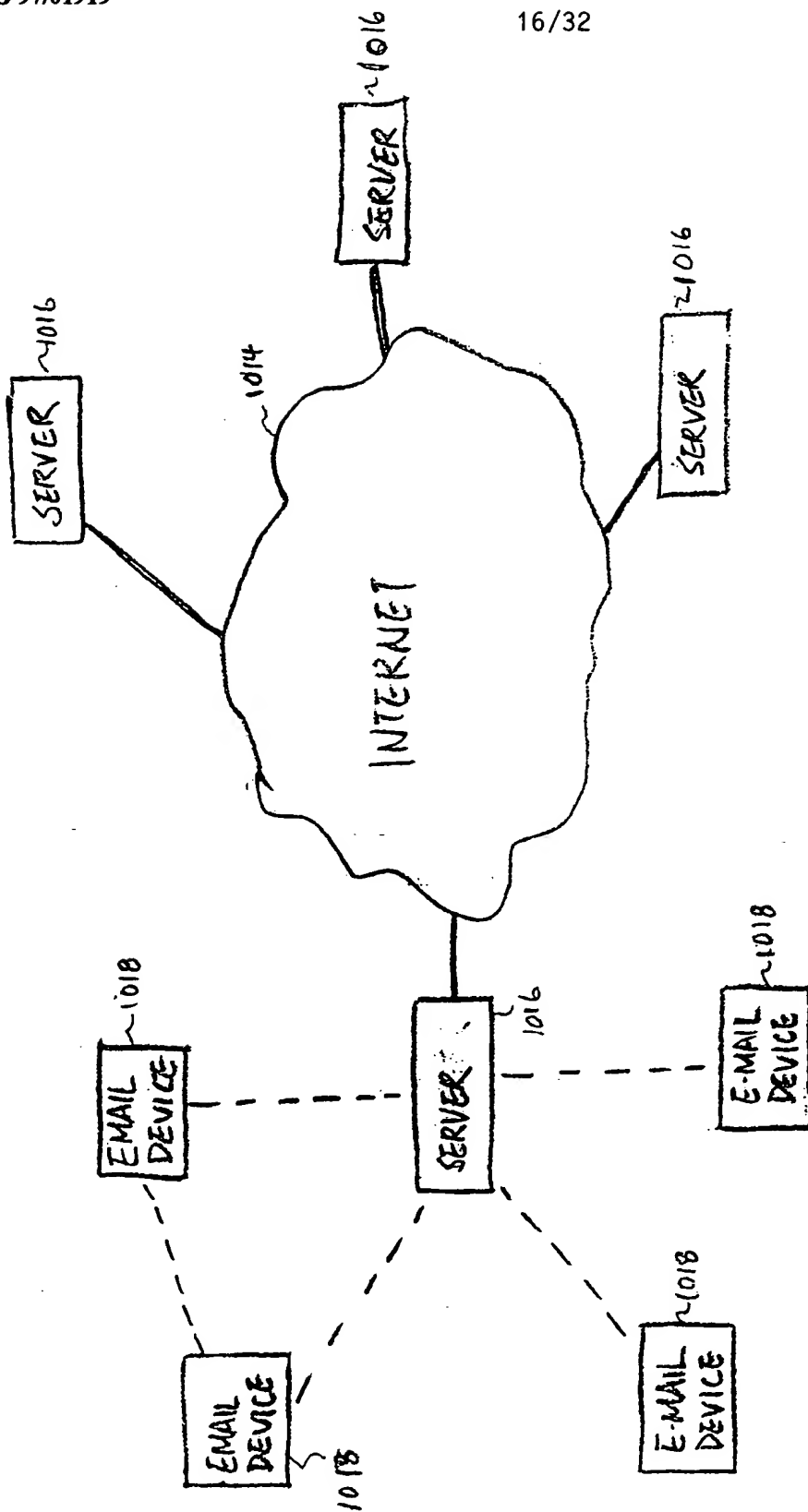


Fig. 12

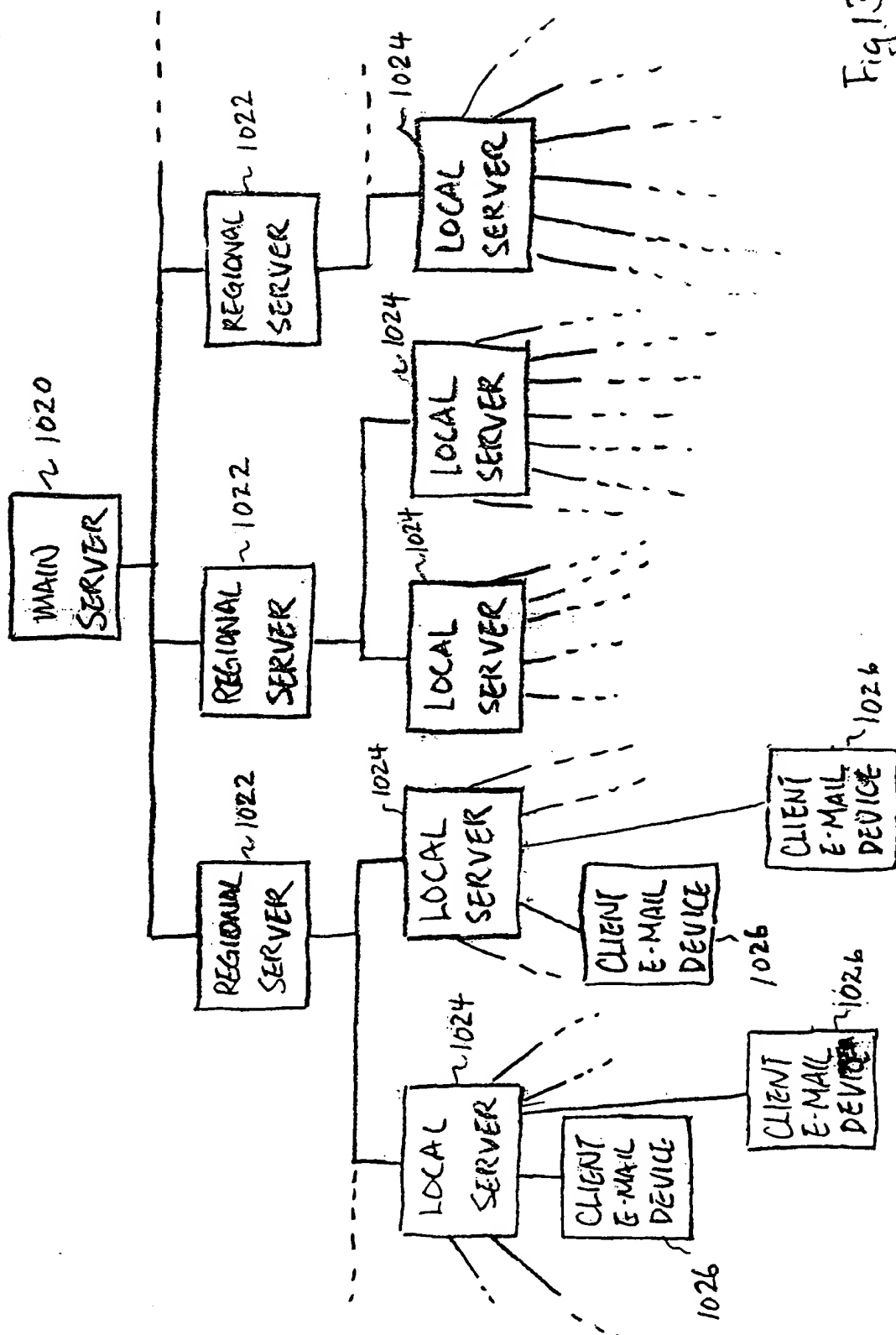


Fig.13

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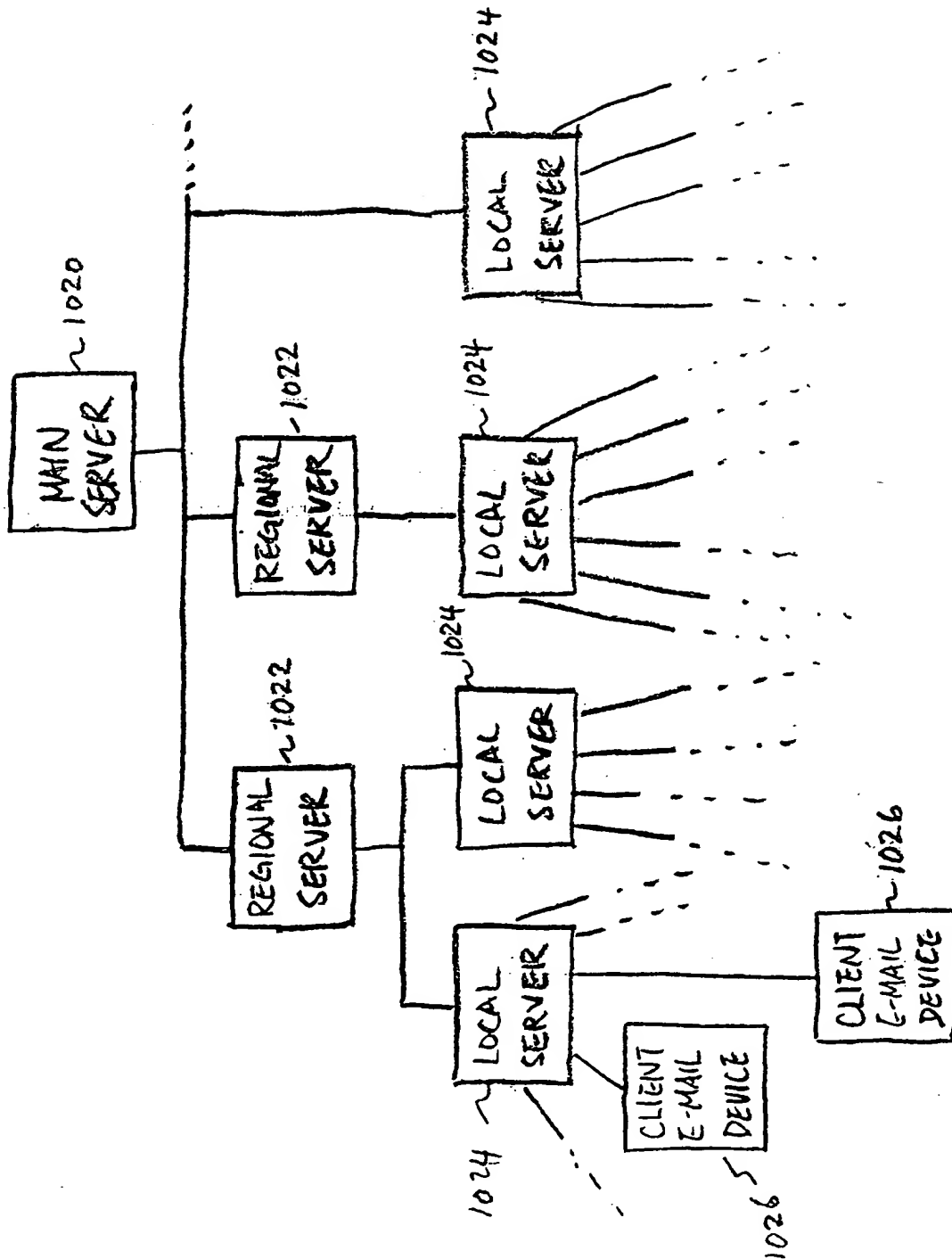


Fig. 14

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Fig. 15

Registration process:

get machine id
 get security code
 get notification code from e-mail device
 get phone number for e-mail device
 search for the phone number of the
 corresponding local server
 send local server phone number to
 e-mail device
 update tables for this client

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Fig. 16a

Main Mail Process:

Every x minutes

Process - Incoming-mail

Process - Outgoing-mail

Fig. 16b

Process - outgoing-mail:

- Check for new outgoing mailbox every x minute
 if new outgoing mailbox found,
 for each new outgoing mailbox
 decompress mailbox
 extract outgoing mail messages
 pass outgoing mail messages
 to send mail utility

20/32

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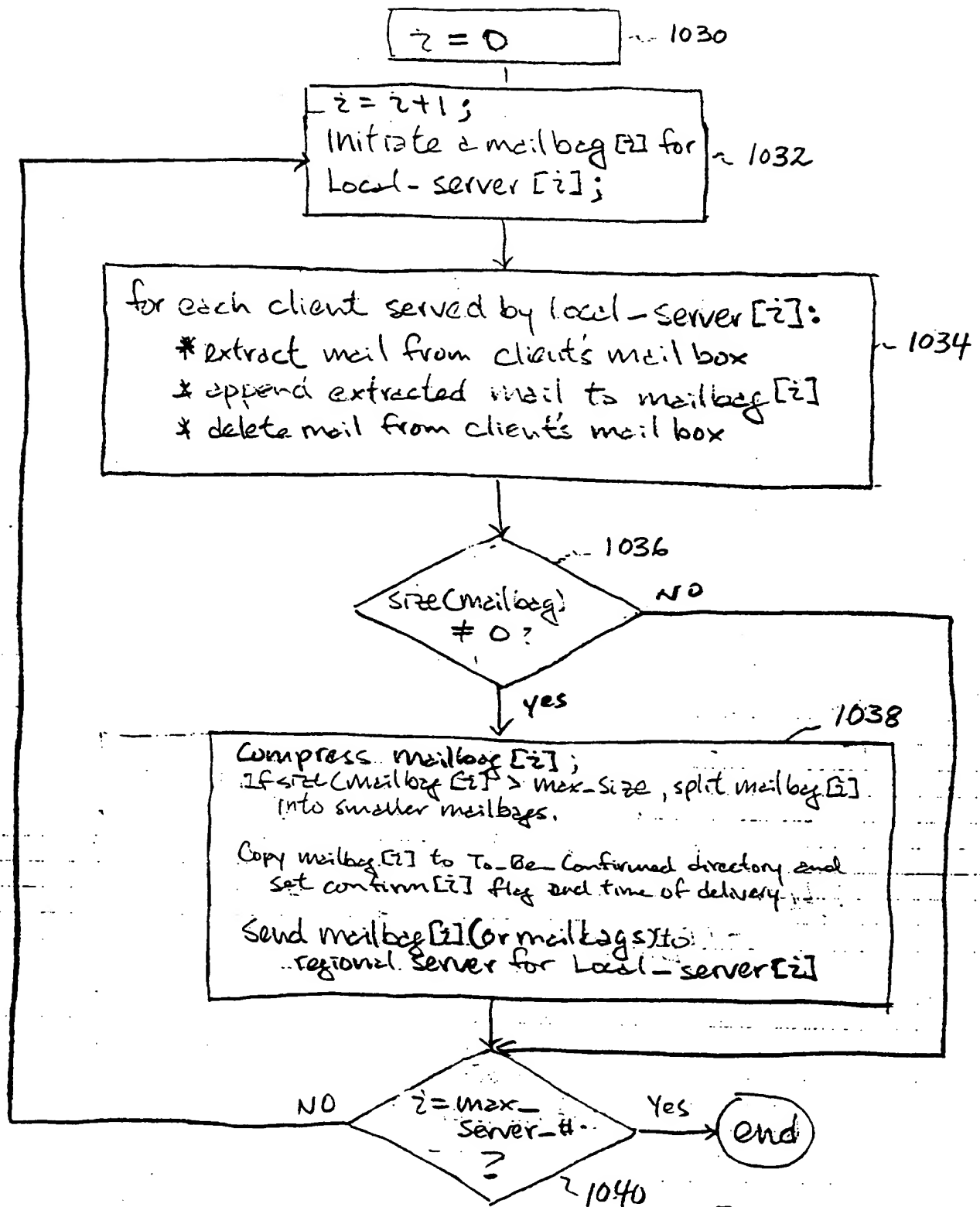


Fig. 16C

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confirm

Every W minutes

for each confirm [i] = true

Search confirmation mail message from local server [i];

If confirmation found

If NOT all mail message in mail bag [i]
are deliveredIf elapse time > max-elapse-time,
extract and place undelivered
mail message in delivery-failed
directory;
notify operator;

If confirmation not found and

elapse time > max-elapse time,
notify operator;

Fig. 16d

Fig. 17a

```

Every x minutes
  get mailbox from regional server
  decompress mailbox
  extract mail messages from mailbox
  identify & place mail into recipient clients
  m_box

```

Fig. 17b

```

Every x minutes
  For each client [i]
    if client [i]. m_box is not empty
      Case (Notification Method):
        notify-only:
          notify-process;
        cell-back-mail-delivery:
          cell-back-mail-delivery;
        Direct-mail-delivery:
          direct-mail-delivery;
      end

```

Fig. 17c

```

Notify-process:
  Get last-logout-time of client [i]
  Check-new-mail-for-client [i]
  if no new mail, or if notification has been sent already, exit;
  else
    label 1: call (client [i] phone number)
      if busy, wait x minutes and goto label 1;
    detect-ring-tone for client [i]. x1 second & disconnect;
    wait w1 second;
    Call (client [i] phone number); if busy, wait x minutes and goto
    label 1;
    detect-ring-tone for client [i]. x2 second & disconnect;
    wait w1 second;
    Call (client [i] phone number); if busy, wait x minutes and go to label 1;
    detect-ring-tone for client [i]. x3 second and disconnect;

```

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Fig. 17d

```

Call-back-Mail-Server:
  try-counter = 0;
  Notify-Process;

  Set Auto Answer for X period of time

  If Client Calls back within X period of time
    Begin
      Handshake;
      Exchange-Mail-Files;
      Disconnect;
      Send-Confirmation-To-Server;
      Send-Outgoing-Mail-To-Server;
    End
  Else
    If try-counter > max-try
      Report error to server
    Else increment try-counter
      goto label 2
  End
end

```

Fig. 17e

```

Direct-Mail-Delivery:
  Try-counter = 0

  label3: Call Client

  If no response from e-mail server
    increment try-counter
    If try-counter > max-try
      report error to server
    Else
      goto label3
    end
  Else
    Handshake;
    Exchange-Mail-Files;
    Disconnect;
    Send-Confirmation-To-Server;
    Send-Outgoing-Mail-To-Server;
  End

```

Fig 17g

exchange - mail - files

Retrieve outgoing mail from client e-mail device;

Get available storage size on the e-mail device;

If incoming mail messages > available storage size

Repackage - mail - messages;

Send incoming mail to e-mail device;

Disconnect;

Fig 17h

Repackage - Mail - Messages:

Sort incoming mail in order of priority

Select mail in order of priority ^{up to available storage size} and leave spacefor a system mail message indicating more
mail message at the local server

Fig 17f

Handshaking:

Check security code

If security code incorrect

disconnect;

report unmatched security code to server

ELSE

Check machine ID

If machine ID incorrect

disconnect;

report unmatched machine ID to server

end

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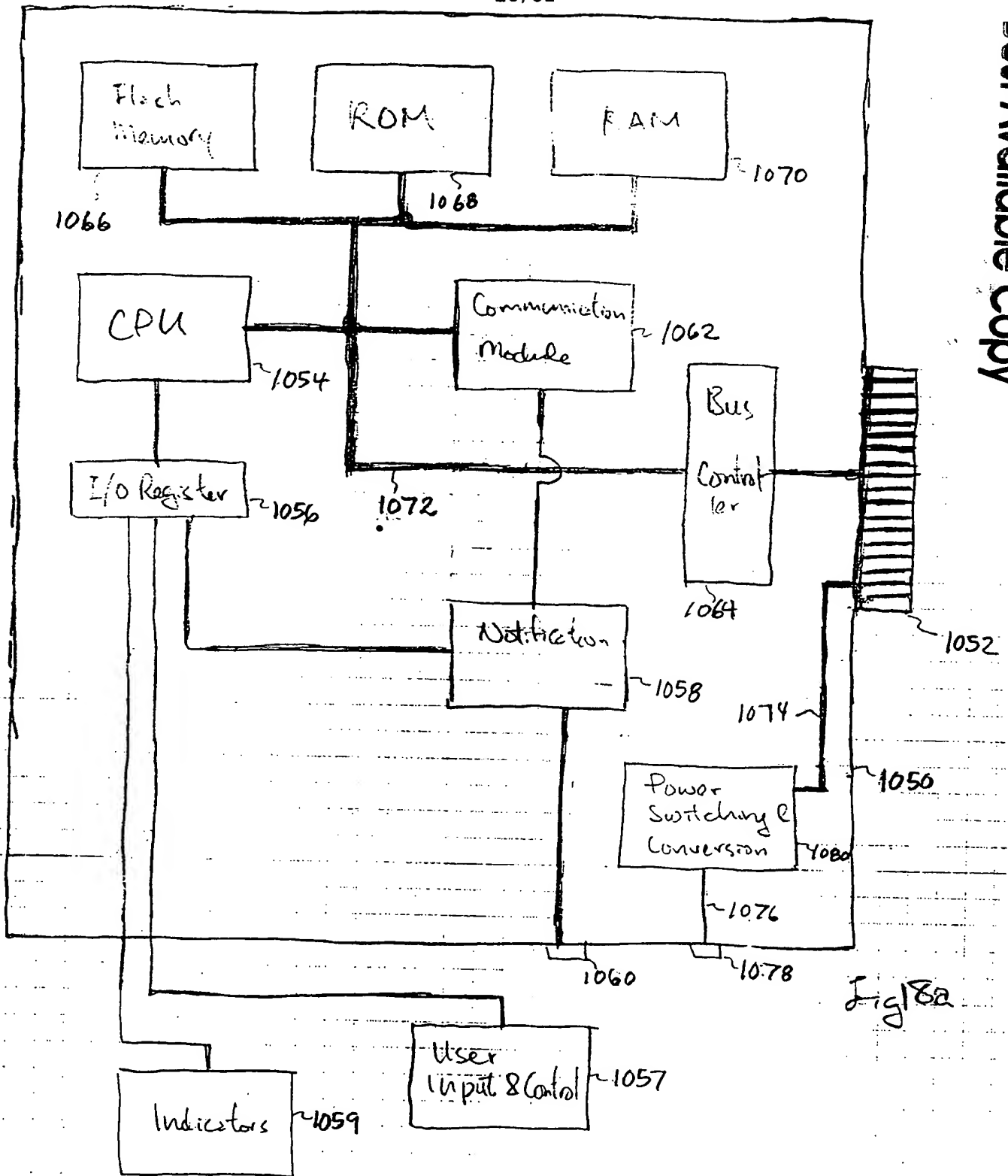


Fig 18b

```
procedure Get_mail;  
  check_card_status  
  if busy wait           // wait until it is not busy  
  else  
  begin  
    check_inmail  
    if not empty move the mail to host  
    empty the inbox on card  
    display_mail  
  end
```

Fig 18c

```
procedure Send_mail;  
  check_card_status  
  if busy wait           // wait until it is not busy  
  else  
  begin  
    check_outmail_sapce  
    if space available move the mail to card  
    done  
  end
```

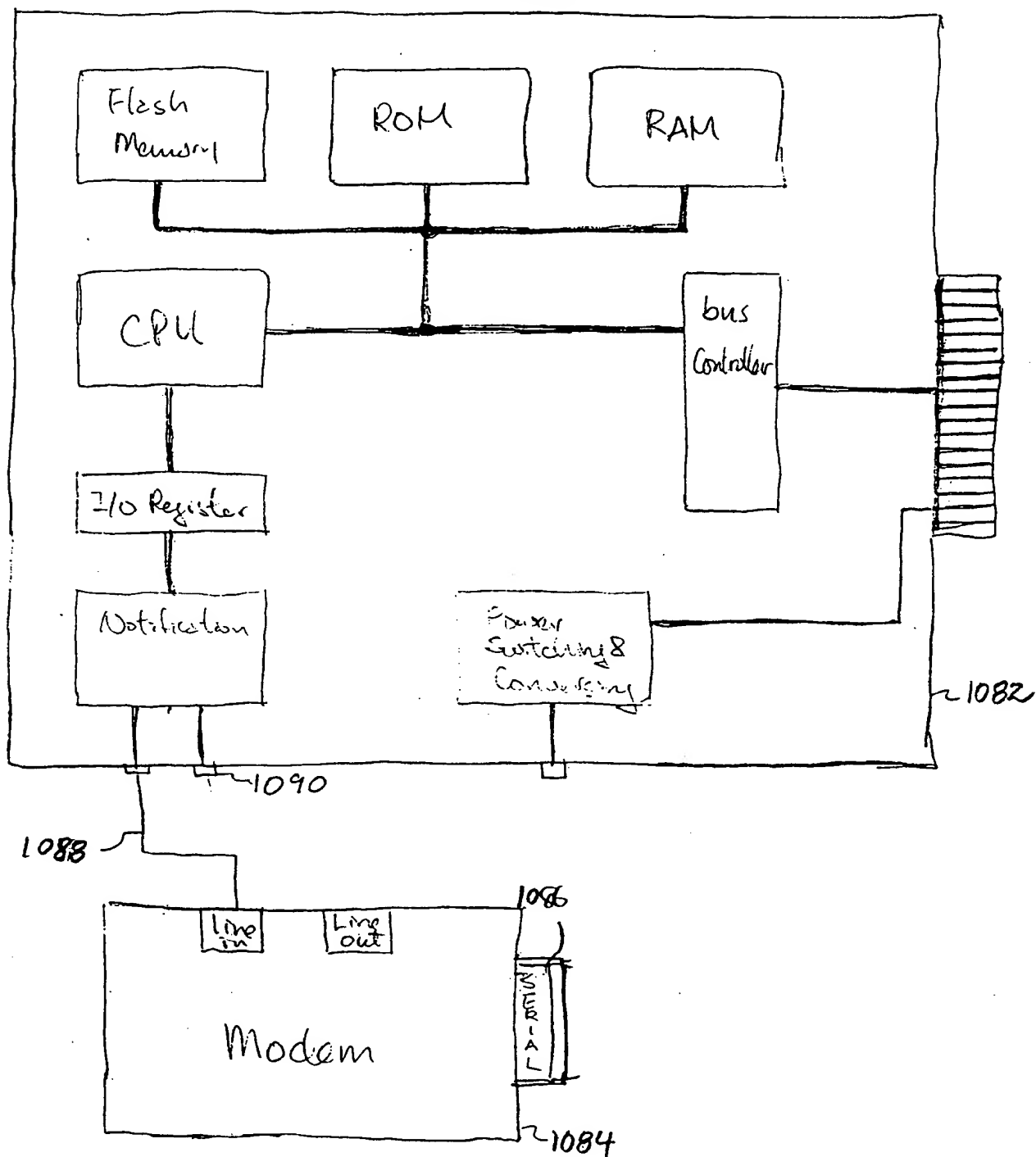
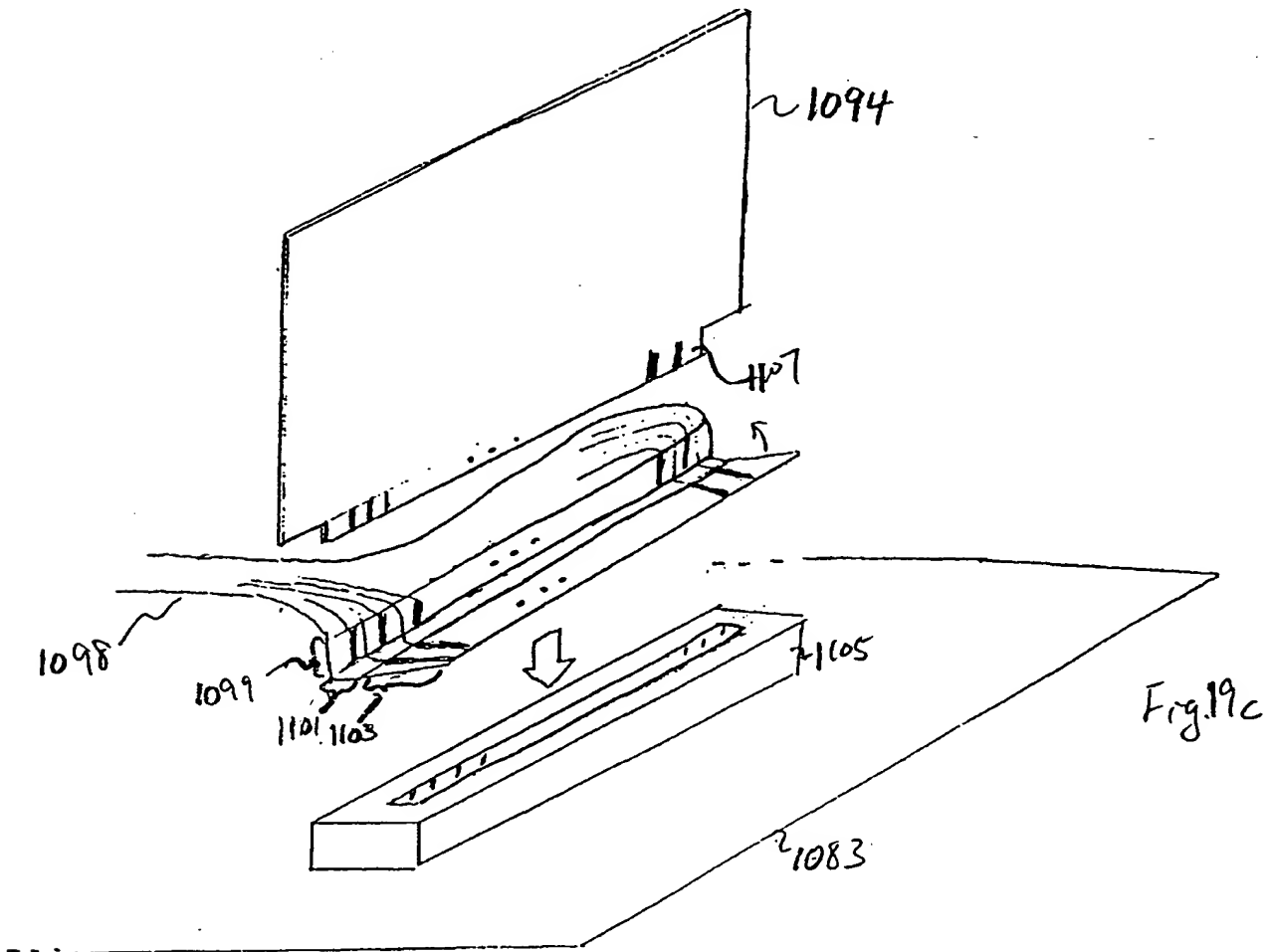
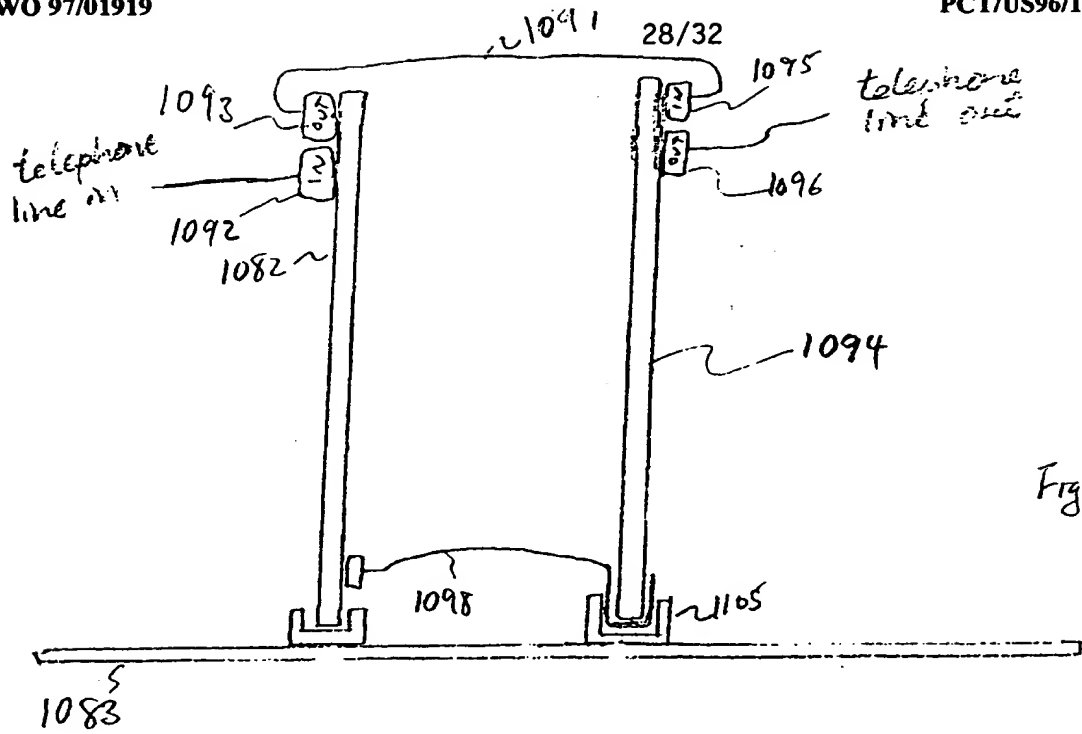


Fig 192

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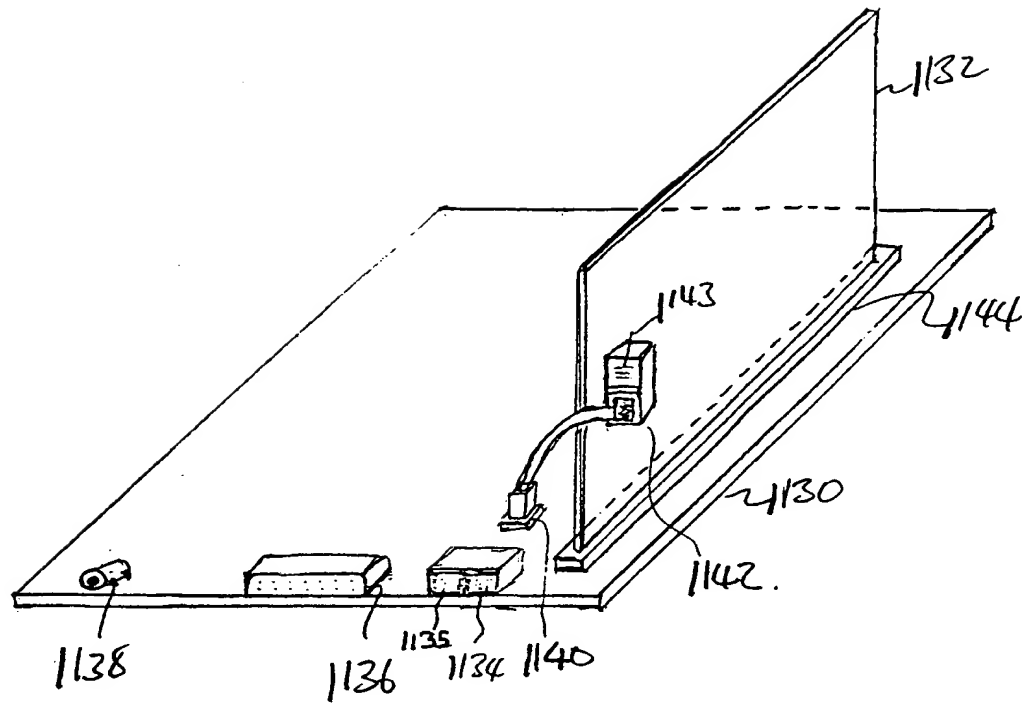
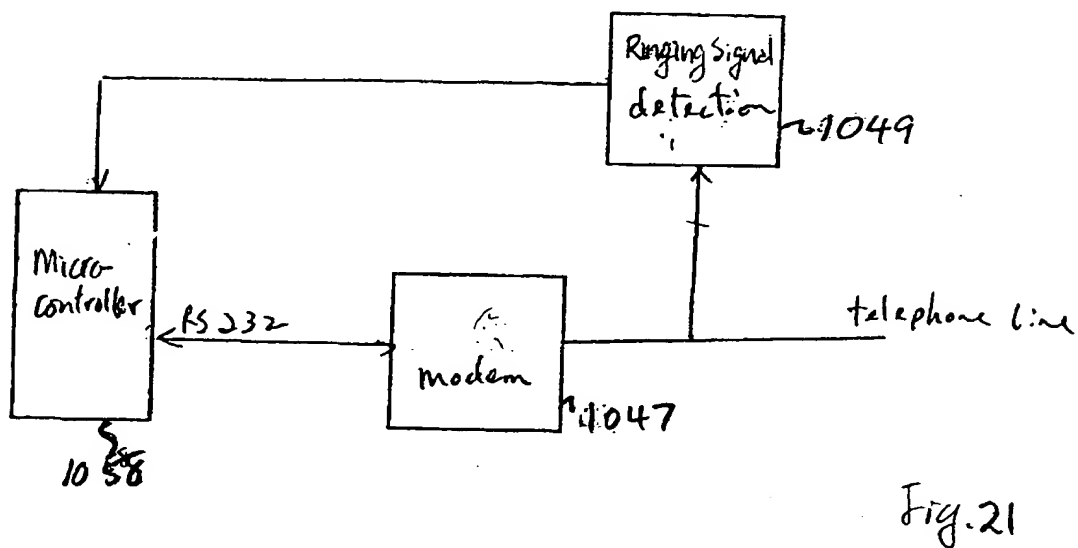
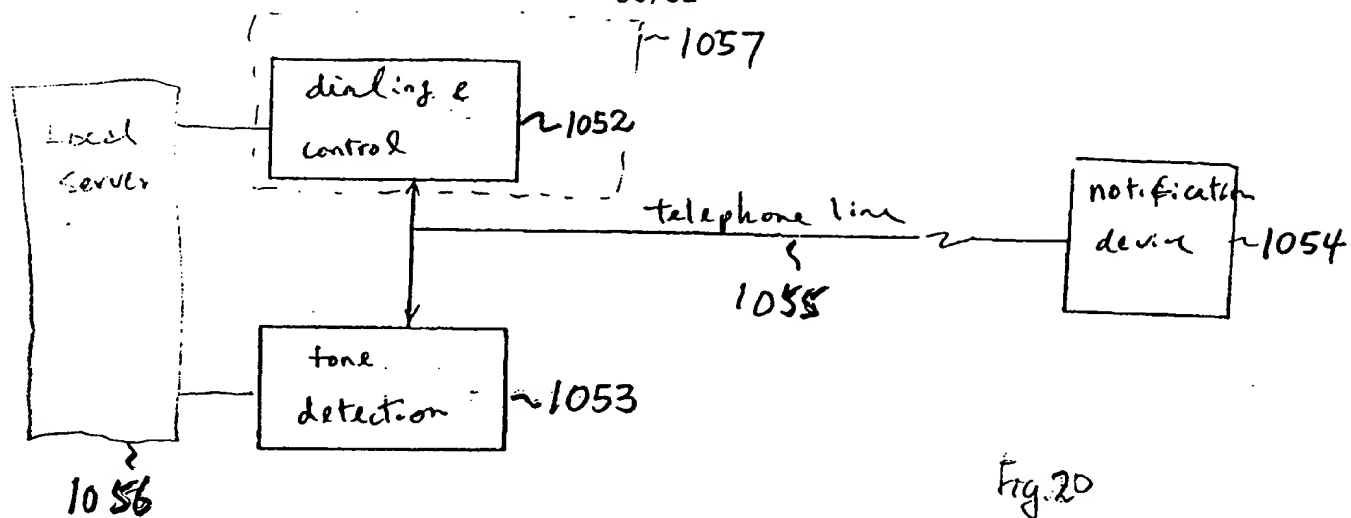


Fig 19d



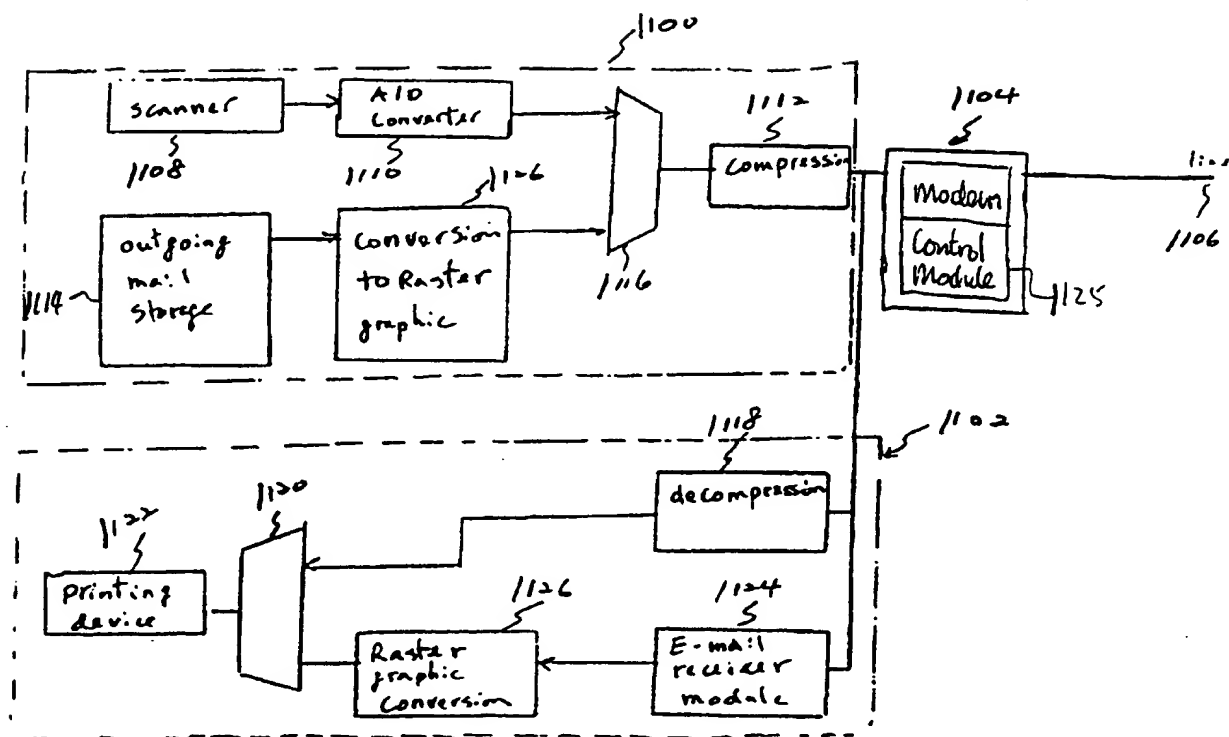


Fig. 22

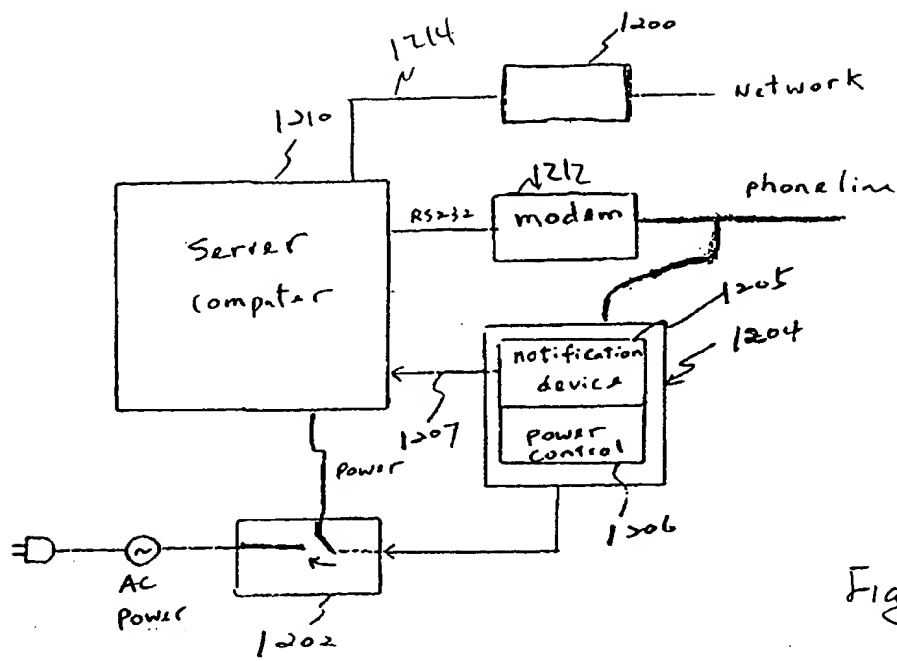


Fig. 23

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US96/11076

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :H04M 11/00

US CL :379/96

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,837,797 (FRENEY, JR.) 06 June 1989, see abstract, all figures.	1-27

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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
O document referring to an oral disclosure, use, exhibition or other means	
P document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

23 AUGUST 1996

Date of mailing of the international search report

09 SEP 1996

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Telephone No. (703) 305-4750

INTERNATIONAL SEARCH REPORT

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PCT/US96/11076

A. CLASSIFICATION OF SUBJECT MATTER

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L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Z* document member of the same patent family
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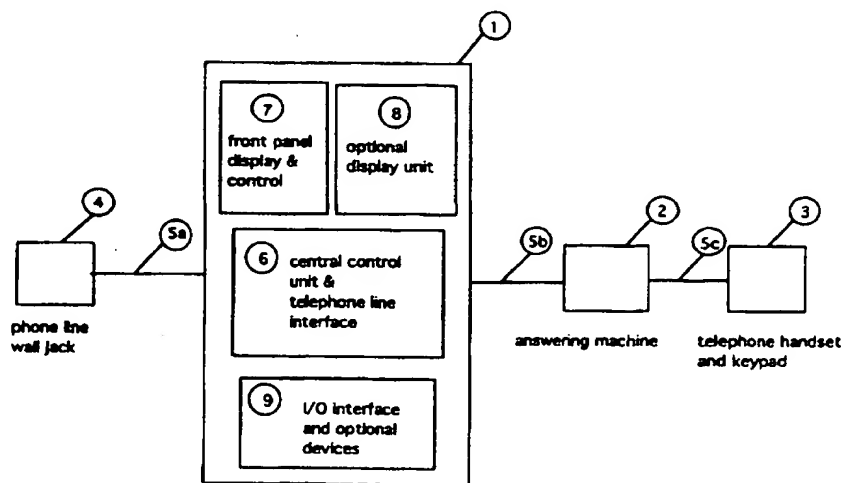
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<p>(51) International Patent Classification ⁶ : H04M 11/00</p>	<p>A1</p>	<p>(11) International Publication Number: WO 97/01919 (43) International Publication Date: 16 January 1997 (16.01.97)</p>
<p>(21) International Application Number: PCT/US96/11076 (22) International Filing Date: 26 June 1996 (26.06.96) (30) Priority Data: 494,652 26 June 1995 (26.06.95) US Not furnished 31 May 1996 (31.05.96) US (71)(72) Applicant and Inventor: WANG, Kevin, Kuan-Pin [US/US]; 11867 Woodhill Court, Cupertino, CA 95014 (US). (74) Agents: HAMRICK, Claude, A., S. et al.; Bronson, Bronson & McKinnon L.L.P., Suite 600, Ten Almaden Boulevard, San Jose, CA 95113 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>With international search report.</i></p>

(54) Title: EVER READY TELEPHONIC ANSWERING MACHINE FOR RECEIVING AND DELIVERING ELECTRONIC MESSAGES



connection of E-mail apparatus and telephone & answering machine

(57) Abstract

The present invention discloses a telephonic E-mail "answering machine" (1) for receiving, processing and storing electronic messages. The E-mail answering machine (1) includes a phone jack (4) for adapting to an existing telephone line for receiving electronic messages from the phone line. The telephonic apparatus further includes a processor (6) for responding to the electronic messages and for storing the messages in the answering machine (1). In another preferred embodiment, the telephonic E-mail answering machine (1) further includes an LCD display (8) for providing information to a user relating to a reception of the electronic messages.

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1
2 **EVER READY TELEPHONIC ANSWERING-MACHINE FOR**
3 **RECEIVING AND DELIVERING ELECTRONIC MESSAGES**

4
5 **BACKGROUND OF THE INVENTION**

6
7 **Field of the Invention**

8 The present invention is generally related to
9 systems for facilitating electronic messages over
10 interconnected computer networks, and more particularly,
11 a system for coordinating and delivering electronic mail
12 messages directly to a novel device for sending and
13 receiving electronic mail messages.

14
15 **Description of the Prior Art**

16 Even with rapid increase in the use of personal
17 computers and computer networks, the benefits of
18 electronic communications in the forms of electronic
19 data (or messages) representing texts, images and sounds
20 are still limited to very small percentage of the
21 population. To the majority of people, the information
22 highway is still too remote. In order to get on the
23 'ramp' of the information highway, more sophisticate
24 processes are required which may involve the use of
25 computer and modem to 'log on' a local server, setting
26 up an account, executing communications programs,
27 sending and receiving messages, and download and upload
28 files. To people in most households, even with a
29 computer and a modem, these tasks are too complicate and
30 not sufficiently 'user friendly'. Even if the
31 technology and the systems are available, there are
32 still many hurdles to overcome before most people can
33 switch to an E-Mail communication mode. Ordinary people
34 are not yet able to take advantage of the existing
35 telephone systems and micro-processors or computers to
36 routinely communicate with 'electronic mail' (E-Mail)
37 for sending and receiving electronic messages.

38 The telephone system has been greatly enhanced and
39 become a widely accepted communication apparatus in

1 households and offices since its invention. The examples
2 include the telephone answering system found in
3 households, the voice mail system used in office
4 environments. The telephone answering system, including
5 a tape recorder and some control circuits, provides a
6 very affordable and easy-to-use telephone apparatus. It
7 answers the incoming phone call by taking a series of
8 steps. It performs an off-hook operation to simulate the
9 action of human-being picking up a handset Then, it
10 starts the communication by making an announcement and
11 takes the message from the caller by recording the
12 message on an audio tape. when it finishes, it hangs up
13 and sets the incoming message indicator, such as
14 blinking a LED. The party being called can look at the
15 indicator and knows immediately how many messages are on
16 the machine. To retrieve the message, all it takes is to
17 push one button. The regular tape recorder functions,
18 such as STOP, PLAY, FAST FORWARD and REWIND, are
19 available to the telephone answering system. The system
20 has been so widely accepted that many manufacturers have
21 integrated the answering/recording functions within a
22 telephone apparatus. The voice mail system takes a step
23 further. It creates individual voice-mail box for
24 everyone on the list. It allows the sharing of one
25 telephone answering system but still keeps the privacy
26 of the individual.

27 While voice communication through the telephone
28 becomes part of our daily lives, the widely used
29 computer has created another format of communication-
30 data communication, One of them is electronic mail, or
31 E-mail. The electronic mail may contain text, image and
32 digitized voice It provides a great alternative of
33 communication among people. Through computer network
34 system, one person can send a mail to another person
35 anywhere in the world as long as the addressee has a
36 computer connected to the same network The increasing
37 popularity of the global computer network the Internet,
38 has made the E-mail more useful than ever.

39 These two important ways of communication by the

1 use of telephone and computer networks have worked very
2 well in voice and data communication respectively. More
3 sophisticate computer users are able to use computer
4 with modem to conned with existing telephone networks to
5 manage both data and voice communication, However, since
6 the telephone lines can only be used on a 'dedicated'
7 basis. Voice or data communication is totally blocked
8 for a segment of time when that line is occupied in
9 connecting by modem to computer networks or when two
10 people are talking using' the phone. Because of the
11 nature of operation, an electronic message, which has
12 arrived at a server station, has to wait until a user
13 logs on thus much useful time is wasted. This passive
14 nature of E-mail delivery thus generates waste of useful
15 resources and time when the messages are idle waiting to
16 be retrieved.

17 There are some attempts to integrate a plurality of
18 media communication in office environment Some
19 representative examples are U.S. Pat No.5,333,266,
20 entitled METHOD AND APPARATUS FOR MESSAGE HANDLING IN
21 COMPUTER SYSTEMS, issued to Boaz et al. on Jul.26, 1994
22 and U.S. Pat No. 5,349,636, entitled INTERFACE SYSTEM
23 AND METHOD FOR INTERCONNECTING A VOICE MESSAGE SYSTEM
24 AND AN INTERACTIVE VOICE RESPONSE SYSTEM, issued to
25 Irribarren on Sept.20, 1994. Both rely on a powerful
26 computer and a local area network to integrate multiple
27 message systems. They were designed for office use not
28 suitable for households or small offices. Another
29 example is U.S. Pat 5,193,110, entitled INTEGRATED
30 SERVICES PLATFORM FOR TELEPHONE COMMUNICATION SYSTEM. It
31 is specifically designed for use in the central office
32 of telephone company or in a large corporate office.
33 These inventions do not provide a solution to the
34 difficulties that higher skill level of computer are
35 required for E-Mail communication, Regular daily use of
36 E-Mail communication in homes, college dormitories and
37 small offices are still not so convenient for most
38 people.

39 Popular and routine use of E-Mail communications

1 are still hindered by current requirements of equipment
2 and network configurations. First, the E-mail is limited
3 to those who have access to computers or terminal
4 devices connected to a host computer capable of process
5 E-mail. This may not be a problem in modem offices
6 equipped with computers and networks for connecting to
7 host computers or network servers. But it becomes a
8 significant limiting factor for households and offices
9 without the modem equipment or connecting networks.
10 Secondly, the actual reception of the electronic
11 messages can only be performed when the receiving
12 computers, i.e., terminals for communication, are
13 connected to E-mail server. The usefulness of E-mail is
14 greatly limited in terms of timelines of the messages.
15 In order to assure that no important messages are
16 missed, a user has to log on to the network in a routine
17 manner to 'check the mail' regularly. It may become
18 burdensome during some inconvenient time. In order to
19 resolve this difficulty, Clercq discloses in a U.S. Pat
20 5,138,653, entitled SYSTEM FOR AUTOMATIC NOTIFICATION OF
21 THE RECEIPT OF MESSAGES IN AN ELECTRONIC MAIL SYSTEM
22 (issued on Aug. 12, 1992), an E-mail system for making a
23 call to an E-mail addressee which is triggered when a
24 message is received. An addressee is then required to
25 retrieve the E-mail from remote station by the use of a
26 computer. It may even be more inconvenient than a
27 beeper' as the addressee may not be in a convenient
28 place with access to a computer and modem to log on to a
29 server.

30 Therefore, a need still exists in the art of system
31 design and device manufacture for electronic message
32 communication to overcome these bottlenecks and
33 inconveniences which limit the usefulness of the E-mail.
34 Specifically, it is desirable to provide a telephonic E-
35 mail apparatus which provides functions similar to a
36 phone answering machine which is ready for a user for
37 receiving, viewing or listening to the received
38 electronic messages in a 'plug and play' fashion.
39 Additionally, in order to minimize any inconvenience

1 thus caused to a user, it is desirable to adapt the
2 telephonic E-mail apparatus without interfering existing
3 telephonic communication operations. A user would thus
4 be allowed to operate a telephone or phone answering
5 machine with the E-mail apparatus as if no E-mail
6 apparatus had been adapted into the system. An ordinary
7 telephone user would then be provided with a convenient
8 E-mail apparatus ready to be adapted into a telephone
9 system without requiring the use of a computer and
10 applying computer skills whereby the limitations and
11 difficulties of the prior art can be resolved.

12 Moreover, as more and more people have access to
13 computers providing for electronic mail messaging
14 capabilities via the internet or internal networks,
15 electronic mail messages, commonly referred to as e-mail
16 messages, are becoming an integral part of modern
17 communication. The delivery of an e-mail message occurs
18 virtually instantaneously and the recipient of an e-mail
19 message can reply to the message within minutes of the
20 receipt.

21 However, for the situation where a user is
22 connected via a phone line to the network, special
23 problems exist. In this scenario, e-mail communication
24 requires certain hardware and software combination in
25 order for the user to send and receive e-mail messages.
26 Generally speaking, for connection to the internet via a
27 phone line to a network server, the necessary hardware
28 includes a computer and a communication device such as a
29 modem. Software wise, a mail program for the sending
30 and receiving of e-mail messages is needed.
31 Additionally, there may be a monthly subscriber charge
32 for connect time to the server imposed by a internet
33 service provider if the user is not connected via a
34 prepaid network. Overall, economically speaking, it can
35 be a significant investment to have a computer set up
36 for the sending and receiving of e-mail messages.
37 Moreover, the necessary hardware and software are fairly
38 complex and may be difficult to set up by a novice user.
39 These barriers bar majority of people from communicating

1 with e-mail messages.

2 Even if a user has a complete computer system setup
3 for the sending and receiving of e-mail messages, there
4 are problems with receiving the messages in a timely
5 manner, with power consumption, and with security risks.

6 In order to receive e-mail messages in a timely
7 manner, a user must either manually and periodically
8 dial into a network server or program the computer to
9 automatically and periodically dial into the server to
10 check and retrieve new mail messages. The manual method
11 is a time consuming and tedious process that distracts
12 the user from productive use of his or her time. The
13 automatic method requires that the computer be left on
14 all of the time which wastes power and may incur
15 telephone toll charges every time the computer calls the
16 server. If the network server is programmed to call and
17 deliver a new message to the user's computer upon
18 receiving it, the user's computer must be left on all
19 the time which again wastes power.

20 Moreover, whenever a computer is left on, there is
21 a risk of security breach where there might be
22 unauthorized access to the computer via either the phone
23 line or from the keyboard by an unauthorized person and
24 thereby compromising the user's computer system.

25 All in all, the above described factors prevents e-
26 mail messages from being delivered to every household.
27 Thus, a new e-mail system and a low cost device are
28 needed to provide an universal e-mail messaging system
29 capable of sending and receiving e-mail messages from
30 and to every household.

31

32 SUMMARY OF THE PRESENT INVENTION

33 It is therefore an object of the present invention
34 to provide an apparatus and a new communication system
35 architect and process ready for implementation on
36 existing telephone system to overcome the aforementioned
37 difficulties encountered in the prior art.

38 Specifically, it is an object of the present
39 invention to provide an apparatus ready to adapt to an

1 existing telephone system in a 'plug-and-play' manner to
2 receive and delivery electronic messages including text,
3 images, and digitized voice signals whereby every
4 household with a telephone can easily access to and be
5 benefited by electronic messages without requiring more
6 complicate processes of employing computer and modem and
7 managing the execution of communication programs before
8 such messages can be exchanged thereon.

9 Another object of the present invention is to
10 provide a telephonic electronic message 'answering
11 machine' which is equipped with user friendly features
12 similar to a convention answering machine without
13 interfering with existing telephone functions such that
14 every regular house can apply such an apparatus
15 immediately.

16 Another object of the present invention is to
17 provide an electronic message apparatus which stores
18 initial registration and subsequent logon information
19 therein to automatically dial up several local servers
20 directly, subject to user selection, to perform the
21 initial registration and subsequent logon functions such
22 that more complex functions of registration and logging
23 on to a server can be managed automatically.

24 Another object of the present invention is to
25 provide an electronic message apparatus which can
26 coordinate with a server to perform message screening
27 and message prioritizing functions such that a user can
28 pre-arrange to receive or screen types of messages
29 according to the importance of such messages.

30 Yet another object of the present invention is to
31 provide a method and apparatus for facilitating,
32 sending, and receiving of e-mail messages through
33 interconnected computer networks or telephone networks.

34 A further object of the present invention is to
35 provide a low cost method and apparatus for transmitting
36 and receiving e-mail messages.

37 Yet another object of the present invention is to
38 provide a low cost method and apparatus for delivering
39 e-mail messages incurring minimum telephone toll

1 charges.

2 Briefly, in a preferred embodiment, the present
3 invention includes a telephonic apparatus for processing
4 electronic messages which includes a means for adapting
5 to an existing telephone line for receiving electronic
6 messages including digitized signals. The telephonic
7 apparatus further includes a processing means for
8 responding to the electronic messages and for storing
9 the messages therein. In another preferred embodiment,
10 the telephonic apparatus further includes an user
11 interface means for providing information to an user
12 relating to a reception of the electronic messages.

13 In another embodiment, a system for facilitating,
14 sending and receiving e-mail messages is disclosed.
15 This e-mail system is supported by one or more main
16 servers and a plurality of regional servers
17 geographically distributed in populated areas, and are
18 interconnected via a computer network such as the
19 internet. An incoming e-mail message under this system
20 is first processed and packaged by the main server to
21 allow tracking of this message. The packaged message is
22 then sent to the designated local server via a regional
23 server. The local server receives the e-mail message
24 and notifies or delivers the message to a client (user)
25 e-mail device through one of several available methods.
26 These methods include direct mail delivery, call-back
27 mail delivery, and notify-only. Under the notify-only
28 method, the local server uses an optional ringing
29 protocol to notify the e-mail device that there is a
30 mail message waiting. Under the call-back delivery
31 method, the local server uses the optional ringing
32 protocol to notify the e-mail device, and the e-mail
33 device then calls the local server to retrieve the
34 message. Under the direct-delivery method, the local
35 server calls the e-mail device and delivers the message.
36 The e-mail device is a novel device designed to send and
37 receive e-mail messages. It is a low cost device that
38 may be a stand-alone device, a part of a multi-function
39 device, or a part of a computer expansion card. The

1 servers of the present invention can be maintained and
2 operated remotely.

3 An advantage of the present invention is that it
4 provides a method and apparatus for facilitating,
5 sending, and receiving e-mail messages through
6 interconnected computer networks and/or telephone
7 networks.

8 Another advantage of the present invention is that
9 it provides a low cost method and apparatus for
10 transmitting and receiving e-mail messages.

11 Yet another advantage of the present invention is
12 that it provides a low cost method and apparatus for
13 delivering e-mail messages while minimizing telephone
14 toll charges.

15 These and other objects and advantages of the
16 present invention will no doubt become obvious to those
17 of ordinary skill in the art after having read the
18 following detailed description of the preferred
19 embodiments.
20

21 BRIEF DESCRIPTION OF THE DRAWINGS

22 Fig. 1 is a diagram showing how the present
23 invention of the E-mail apparatus connects with the
24 existing telephone answering system.

25 Fig. 2 is a block diagram of the present invention
26 of E-mail capable telephone apparatus.

27 Figs. 2a, 2b, 2c, 2d are preferred embodiments of
28 communication systems which incorporate an E-mail
29 apparatus of the present invention.

30 Fig. 4 is an implementation example of a basic
31 front control panel of the apparatus.

32 Fig. 5 is an example of more complicated or non-
33 frequently used functions menu of the apparatus.

34 Fig. 6 is a flow diagram of the easy registration
35 process.

36 25

37 Fig. 7 is a flow diagram of a typical E-mail
38 collecting process.

39 Fig. 8 is a flow diagram of an E-mail receiving

1 process.

2 Fig. 9 is a flow diagram of the E-mail delivery
3 process on the E-mail sever.

4 Fig. 10 is the overall network connection diagram.
5 It shows how the E-mail ready telephone communicates
6 with the server and the rest of the world.

7 Fig. 11 illustrates a conceptual representation of
8 the internet, a number of servers connected to the
9 internet, and a number of computers connected to each
10 server;

11 Fig. 12 illustrates a conceptual representation of
12 the e-mail system of the present invention utilizing the
13 internet, servers, and e-mail devices;

14 Fig. 13 shows a hierarchial relationship between
15 the main server, regional servers, and local servers;

16 Fig. 14 shows another hierarchial relationship
17 between the main server, regional servers, and local
18 servers where the local servers may be connected
19 directly to the main server;

20 Fig. 15 illustrates the steps for registering an e-
21 mail device;

22 Figs. 16a-16d show the pseudo code for the
23 procedures residing on the main server for facilitating
24 incoming and outgoing e-mail messages;

25 Figs 17a-17h show the pseudo code for the
26 procedures residing on the local server for interacting
27 with the main server and the e-mail device;

28 Fig. 18a shows a computer expansion card
29 implementation of the e-mail device;

30 Fig. 18b-18c illustrate the pseudo-code for the
31 software residing on the computer system for operating
32 the e-mail expansion card;

33 Fig. 19a-19d show other computer expansion card
34 implementations of the e-mail device used in conjunction
35 with a fax/modem;

36 Fig. 20 illustrates a block diagram of the
37 components in implementing the ringing protocol on the
38 local server side;

39 Fig. 21 illustrates a block diagram of the

1 components in implementing the ringing protocol on the
2 e-mail device side; and

3 Fig. 22 illustrates a block diagram of an
4 integration of a faxing device and the e-mail device.

5 Fig. 23 illustrates a configuration for remote-
6 controlling a server computer using the ringing protocol
7 of the present invention.

8

9 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

10 Referring to Fig. 1, the block diagram shows how
11 the present invention of the E-mail apparatus connects
12 to the telephone and the answering system. A twisted-
13 pair of telephone line 5a connects the phone jack 4 on
14 the wall to the "line" connector on the E-mail apparatus
15 1. Another telephone wire 6 connects the "phone"
16 connector on apparatus 1 to the answering system 2. Then
17 the answering system 2 connects to the telephone
18 (handset and keypad) through line 5c. if there is no
19 answering machine, line 5b connects to the telephone
20 directly. Every incoming phone call will be taken by the
21 E-mail apparatus first. If it is not for E-mail, it will
22 pass the call to the answering system. It is important
23 to maintain the same functionality of the existing
24 telephone answering system when the apparatus is added
25 to the telephone/answering system. It will be clear when
26 we explain the inside of the apparatus 1. In Fig 1. it
27 shows that the apparatus has 4 major building blocks:
28 central control & telephone line interface unit 6, front
29 panel display and control 7, optional display unit 8,
30 I/O interface and other devices 9. Only the central
31 control & telephone line interface unit 6 is needed for
32 every apparatus. The others may have many different
33 combinations.

34 Fig. 2 is the internal detailed diagram of the E-
35 mail apparatus. Processor 11 reads the codes stored in
36 ROM 12 and performs its duty according to the request
37 from the user. For example, if the auto-collect is set
38 up, processor 11 will receive an interrupt signal from
39 interrupt controller 17. The interrupt will be serviced

1 by processor 11 to set up modem 23 through universal I/O
2 bus 20 and dial the designated E-mail server to collect
3 the E-mail. By using an universal I/O bus 20, it makes
4 the architecture flexible to add or reduce its
5 functions. Block 14 contains logic to interface system
6 bus and I/O bus. Blocks 11-20 constitute the basic
7 central control unit. Blocks 21-23 belong to the
8 telephone interface unit. The basic control and display
9 unit has blocks 25 and 26. Block 28 is the display for
10 mail reading and block 27 is the controller for block
11 28. There are two displays in Fig. 2. The small display
12 in 26 is used for control and status information. To
13 display mail, a bigger display 28 is more suitable. If
14 display 28 is built-in, display 26 can be eliminated. If
15 the user relies on data export function to move E-mail
16 files to his computer and to read the mail there,
17 display 26 alone will be enough. Display 28 can be a
18 LCD, monitor or a TV, and display control 27 will be a
19 compatible controller. RAM 12 is a device used as a
20 scratch pad for processor during the execution of the
21 codes from ROM 12. ROM 12 can be a flash memory.
22 Processor 11, ROM 12, RAM 13 and I/O bus controller 14
23 are connected to system bus 15. I/O bus controller
24 allows the processor to communicate with all the other
25 I/O devices. Real time clock 19 keeps track of the time.
26 Timer 18 and interrupt controller 17 are used for
27 program flow control. Clock and power management 16 is
28 used to save the power consumption of the apparatus.
29 when power consumption is not a concern, block 16 can be
30 as simple as a clock chip. Processor 11 responds to the
31 user request from front panel control 26 through panel
32 interface block 25. It also uses panel interface block
33 25 to display other information to user. UART 22 is a
34 serial communication block, it is used to move data
35 between the E-mail apparatus and the external world.
36 Through the modem and telephone line, it connects the
37 apparatus to other communication devices. With a local
38 RS-232 or infra-red link, it can import/export data
39 to/from a computer, digital organizer or printer.

1 Display control 27 is to display the mail on a display
2 device 28. Some desirable devices such as secondary
3 storage device 21, audio device 29 are optional add-ons.
4 If a reasonable size of flash device is used as storage,
5 block 21 will not be important Telephone interface block
6 24 controls the interface with telephone line, telephone
7 answering system and modem. The details of block 14 are
8 shown in the diagram of Fig 3.

9 There are many electronics devices available to
10 implement Fig 2. Here is one example. Use the single
11 chip platform VG-230 from Vadem (San Jose, California)
12 for blocks 11, 15, 16-19, 20, 22, 27 in Fig. 2. This
13 chip has processor, memory controller, I/O bus and many
14 I/O peripheral devices integrated into a single chip.
15 Modem (block 23) can be the single-chip modem SSI
16 73K321L from Silicon Systems (Tustin, California).

17 Figs. 2a - 2d are preferred embodiments showing
18 some of the possible combinations of the modules. Fig.
19 2a uses TV as a primary display of mail. Block 28 in
20 Fig. 2 is replaced with a television 28a. Flash memory
21 12a is used for codes and mail storage space. This is
22 one of the simple implementations. Fig. 2b is suitable
23 for people who have access to the computer. It is
24 comprised of a floppy controller and drive. The mail is
25 save on a floppy diskette. The user can take diskette to
26 a computer and read mail there. Block 25 can be
27 simplified since there is no need to control the display
28 of mail. This is an example of how to count on data
29 export function to reduce the configuration of the
30 apparatus. Fig. 2c is another example of data export
31 function except using different means of moving data is
32 used. It uses Infra-red link o move data to/from the
33 computer. In both cases, outgoing mail can also be
34 imported from diskette or infra-red-link. Fig. 2d is an
35 example with extensive functions. It contains removable
36 flash memory card 26b using industry standard PCMCIA
37 interface to save mail. It has a built-in LCD display
38 28b for reading mail. An audio device 29a will generate
39 voice if the incoming mail contains a digitized voice

1 file.

2 Fig. 3 is the diagram showing internal block of the
3 telephone interface function. When the system is in idle
4 state (i.e. no incoming phone call), line switch 31 is
5 set to telephone line 35 and interface control 34 and
6 line 39 is open. When there is an incoming phone call,
7 the telephone line interface control 34 will generate an
8 off-hook to the caller and then monitor line 35 to see
9 if it is an E-mail communication from line 38. If it is
10 not, interface control 34 triggers a ring through the
11 ring control 32 and lines 40, 41 and 42 to the telephone
12 answering system. When handset/keypad interface block 33
13 detects off-hook signals on line 37 from the telephone
14 answering system, line switch 31 turns the switch to
15 line 39. Then the telephone is in control. The E-mail
16 apparatus gives up communication to the
17 telephone/answering system. This is a very important
18 process for maintaining the function of telephone
19 answering system function as if the E-mail apparatus is
20 absent. In the case of E-mail communication, line switch
21 31 keeps the phone line connected to 35 all the time.
22 Handset and keypad interface block 33 also becomes
23 active when the keypad is used to control the E-mail
24 apparatus or to edit an outgoing mail. The keypad
25 information will be passed to the processor to respond.

26 Fig. 4 is an example to show the concept of the
27 easy-to-use interface. Block 51 is a simple display
28 panel. Blocks 52-57 are control buttons. Button 58 is a
29 control button and an indicator. A blinking indicator 58
30 means an incoming mail is ready for retrieval. The user
31 can push button 54 to read the mail. At every push of
32 button 54, a full page of mail would be displayed to fit
33 into the size of the display. Push button 55 to jump to
34 the next mail. Button 53 is to display the previous
35 page. Pushing button 52 to jump to the beginning of the
36 previous mail. Pushing button 52 longer means back
37 to the beginning of the first mail and the mail will be
38 overwritten when the next batch of mail arrives. Pushing
39 button 58 will dial, send and collect mail. When it is

1 done, a message will be displayed on block 1 and call
2 indicator 8 will be blinking. Button 56 is used to
3 interrupt the E-mail communication when the user needs
4 to use the telephone. Button 57 is a special function
5 button. It provides more complicated or unusual
6 functions. It brings a menu of functions for the user to
7 select. The functions may include registration, mail
8 forward, and mail hold request. The list in Fig. 5 is an
9 example for those functions. The concept of separating
10 all the basic and frequently-used functions from the
11 complicated and infrequently-used functions by different
12 interfaces makes the E-mail apparatus a user-friendly
13 device while maintaining some advanced functions.

14 Fig. 5 exemplifies a list of the menu of more
15 complicated and infrequently-used functions. Function 1
16 is a guided registration process function. Function 2 is
17 to set the current time. Function 3 is to set the
18 programmable secret code. Function 4 is to change the
19 number to dial other than the designated E-mail server.
20 Function 5 is to request E-mail server to hold the mail.
21 Function 6 is to request the forwarding of the mail.
22 Function 7 is to set up the daily auto-dial and connect
23 time with the E-mail server. Function 8 is for data
24 import/export. Function 9 is to display your e-mail
25 address. Function 10 is to request the change of E-mail
26 address if you don't like the assigned address after
27 registration. Function 11 is to run diagnostics on the
28 unit. By pushing button 57 in Fig. 5, the menu of
29 functions will be on the display 51 in Fig. 4. Every
30 push will display next function. Button 58 is used to
31 select the function. When the function is selected, the
32 software in apparatus will guide user through the
33 process. If the unit has a bigger LCD display built-in,
34 it may display all the function at once, and the user
35 can move the cursor around the menu to select the
36 function.

37 Whenever the apparatus does not detect any action
38 from the user for an extended period of time, such as 10
39 minutes, it aborts all the incomplete process and resets

1 to the idle state.

2 Therefore, the present invention discloses a
3 telephonic apparatus for processing electronic messages
4 which includes a means for adapting to an existing
5 telephone line for receiving electronic messages. The
6 telephonic apparatus further includes a processing means
7 for responding to the electronic messages and for
8 storing the messages therein. In another preferred
9 embodiment, the telephonic apparatus further includes an
10 user interface means for providing information to an
11 user relating to a reception of the electronic messages.

12 Fig. 6 is the flow chart of a typical registration
13 process. The user only needs to push a few buttons (step
14 101 in the diagram) and enter the phone number (step
15 103). The process will automatically take place by doing
16 steps 104-111 and an E-mail address will be assigned and
17 displayed (step 108). Step 111 is to search the phone
18 number of the best E-mail server for the user to dial in
19 based on user's phone number and save the number in the
20 apparatus.

21 There are two ways to communicate between an E-mail
22 apparatus and its server. One way is auto-connect, the
23 other is the conventional logon process. when the E-mail
24 apparatus initiates a call to the server, the server
25 will try to auto-connect first. It is an automatic
26 process and requires no user attendance. The first
27 requirement for the auto-connect is that the server
28 knows the user's E-mail address and the machine ID of
29 the E-mail apparatus. The second requirement is that the
30 server and the E-mail apparatus have the same derived
31 password. The derived password is a code generated by an
32 equation based on the P code (programmable code), the
33 user's phone number and the machine ID. In order to do
34 transaction, both need to share the same equation.
35 Checking the machine ID and the derived password, the
36 server can determine the legitimacy of the request from
37 the E-mail apparatus. The auto-connect provides the
38 convenience of automatic downloading mail. But if the
39 checking fails, the server will ask the user to enter

1 the password. This is the case when a different machine
2 is used to download mail, the E-mail apparatus has a
3 different machine ID. The server will not use auto-
4 connect, and a conventional logon process is required to
5 access for security reasons.

6 In the case of a server initiating the call to an
7 E-mail apparatus, the auto-connect is the only way to
8 communicate and get/give access. In other words, only
9 the designated server can deliver mail to the designated
10 E-mail apparatus. This is to provide security and
11 convenience. if the user gets a new E-mail apparatus, a
12 change of registration is required to get the auto-
13 connect function.

14 The following is a detailed process of the access
15 legitimacy checking in the auto-connect mode. First, the
16 apparatus sends its unique serial number (i.e. machine
17 D) to the E-mail sever. Secondly, the apparatus sends
18 its E-mail address to the server. if these two do not
19 match, the server will ask the user to enter the
20 password and the conventional logon process takes place.
21 Otherwise, the E-mail apparatus will proceed to send its
22 programmable code or P code and the derived password to
23 the server. The derived password is generated from the
24 machine ID, P code and user's phone number. It is sent
25 to the server and compared against the derived password
26 from the server. If the server checks and finds it
27 correct the access is authorized. The programmable code
28 or P code to the E-mail sever is used as an instruction
29 to screen the incoming mail and to generate a derived
30 password.

31
32 Fig 7. is the flow diagram to show how the
33 apparatus connects to the E-mail server, sends the
34 outgoing mail and receives the incoming mail. It can be
35 performed on a predetermined time daily (which starts
36 from step 122 in the diagram) or upon the request from
37 the user (which starts from step 121 in the diagram).
38 Steps 127, 129 and 130 are where security and screening
39 processes take place. Steps 134-138 are designed to

1 prevent the overflow of incoming mail and protect the
2 integrity of the received mail. The details are
3 explained later.

4 Fig 8. is the flow diagram of how an E-mail
5 apparatus responds to a request from the server.
6 whenever there is an incoming call, the apparatus will
7 do "off-hook" (step 142) and check if it is an E-mail
8 request (step 143). if it is not, the call will be
9 directed to regular voice communication as steps 144-
10 146. Otherwise, it proceeds to step 147. If the machine
11 ID and derived password checking passes, the transaction
12 starts. if it fails, the call is terminated. Step 148 is
13 an option. It will inform the addressee of a potential
14 problem on the mail delivery. The mail transfer
15 transaction can process the outgoing mail (step 149) and
16 check if the total mail size fits into the E-mail
17 apparatus. if not, only parts (extracted) of the mail
18 are delivered (step 153). Before terminating the
19 process, the incoming mail indicator is updated (step
20 155).

21 The following is the detailed description on how
22 the E-mail server screens the incoming mail. It includes
23 sorting, extracting and repackaging before the delivery
24 of the mail.

25 The present invention uses the extension of the E-
26 mail address and the programmable codes or P code
27 received from the apparatus to determine the importance
28 of the incoming mail. The E-mail address is based on the
29 naming convention on the Internet, called Domain Name
30 System (DNS), with additional field. The DNS has the
31 general format as:

32 <someone>@[subdomain].[subdomain].[...].<domain>
33 where the <...> represents required elements and [...] is optional portion. A typical example looks like:
34 jsmith@sales.abc.com for John Smith in the sales
35 department of ABC corporation "jsmith" is the account
36 name for John Smith. It is assigned to him by the system
37 administrator of the host computer. Usually, it is the
38 logon name used to access the host computer. And abc.com

1 is the name of the host computer connected to the
2 Internet network There is governing body for the host
3 name assignment The name will be translated into 'P
4 address and recognized by the peer on the network Hence
5 a mail from bigbird@xyz.com can be delivered to abc.com
6 host computer through the global network, internet. When
7 the host computer named abc.com receives the mail, it
8 knows its subdomain, sales. It sends the mail to the
9 internal E-mail server in sales department of ABC
10 corporation. When John Smith logons the computer, he
11 will be notified of the arrival of the E-mail.

12 The present invention uses some extensions on top
13 of the DNS to provide some enhancements. The new
14 extended E-mail address for jsmith@sales.abc.com become
15 jsmith[.<specialcodes>]@sales.abc.com. The general
16 format becomes:

17 <<someone>.[specialcodes][ClassofMail]@[subdomain].[...].<dom ain>

18 One example looks like:jsmith.4567ER@sales.abc.com.

19 Here "4567" is used to compare with the P code on the
20 apparatus. The result of the comparison determines the
21 importance of the incoming mail. An incoming mail with
22 special codes completely matching the P code will get
23 the highest priority. A mail with partially matched
24 codes will gain some attention based on how close the
25 address extension codes compare with the security code.
26 In the above examples, "E" indicates the mail is Express
27 mail, so it will be delivered in a more timely fashion.
28 The "R" indicates the mail is registered. It requires a
29 return receipt when the mail is delivered successfully.
30 A mail without the special codes on the E-mail address
31 will be treated by the E-mail server as a regular bulk
32 mail.

33 Since the E-mail ready telephone apparatus is
34 likely to be a small special-purpose device, the
35 relatively limited capacity requires more careful
36 management The P code provides a very simple way to sort
37 the incoming mail and prevent the flooding of the junk
38 mail. But, even with the screening feature, the
39 unexpected volume of incoming mail may still cause mail

1 box overflow. The mail repackaging function on the
2 server will prevent this from happening. It works as
3 follows.

4 After the legitimacy checking, the E-mail server
5 gets the information of available storage on the E-mail
6 apparatus and decides what to send. If the total size of
7 the incoming mail exceeds the available storage space on
8 the apparatus, the E-mail server extracts the incoming
9 mail and "repackages" the E-mail and sends it to the
10 apparatus. The extracting process may reduce the mail
11 size by taking the whole content of high priority mail
12 but only the subject, name of sender from the lower
13 priority mail. It may use a complicated method to
14 achieve the best result from extracted mail. The
15 protocol puts the intelligence and complexity to the E-
16 mail server but keeps the E-mail apparatus simple. It is
17 an important concept in the present invention.

18 Fig 9. is the flow diagram of how an E-mail server
19 processes the mail. Step 166 actually is a two-step
20 process as explained before in Fig. 7. Step 170 sending
21 the outgoing mail and steps 171-172 checking and sorting
22 incoming mail can be done in parallel. Different class
23 of mail may take different steps as shown in step 163
24 (for express mail) and step 176 (registered mail). This
25 flow diagram exemplifies how a mail is processed.

26 Fig. 10 exemplifies the overall network connection.
27 The E-mail ready telephone 200 connects to its local E-
28 mail server 202 through the existing telephone network
29 201. Usually, the local E-mail server 202 connects to
30 the host computer 204 with a LAN (local area network)
31 203. A global network 205 links the host computer 204
32 and 206 together. The network 205 usually is a WAN
33 (wide-area network). Computers 208, 209, 210 and the host
34 computer 206 are connected by a LAN 207. A user can send
35 an E-mail from computer 208 to an addressee of the E-
36 mail ready telephone system 200. The E-mail will travel
37 to the host computer 206 through the LAN 207. The host
38 computer 206 serves as a gateway to the global network
39 205. The mail will be passed to the WAN 205. It may

1 travel through several host computers before reaching
2 the host computer 204 which has the correct domain name
3 of the E-mail address. Then the host computer 204 will
4 look at the E-mail address or the sub-domain name and
5 send the mail to Local server 202 through Local server
6 203. The mail will stay in the server and the process of
7 Fig. 9 takes place. The server will deliver the mail
8 either by dialing the addressee's phone number or by
9 just waiting for the request from E-mail ready
10 telephone. Those are the process flows in Figs. 7 and 8.
11 All the communication process, including legitimacy
12 checking, mail size checking and mail transfer, taken
13 place between the server and the E-mail ready apparatus
14 are through the telephone network 201. when the E-mail
15 apparatus initiates the connection, as described in the
16 process flow of Fig. 7, the server will check if it is
17 the right machine before giving the mail. If the machine
18 ID checking fails, the user has to enter the password to
19 gain access. If the server initiates the call to the E-
20 mail apparatus and finds the incorrect machine ID, mail
21 won't be delivered. But the E-mail apparatus will
22 signifies the addressee of the failed attempt In any
23 case, the server has to request the information of the
24 available storage space on the E-mail apparatus before
25 sending the mail. It may be necessary for the server to
26 determine the priority of the mail based on the p code
27 and extract partial information for delivery. In other
28 words, it is server's responsibility to deliver the
29 proper size of mail to the apparatus.

30

31 DETAILED DESCRIPTION OF A SECOND EMBODIMENT

32 Referring to Fig. 11, the network infrastructure
33 (for a network such as the internet) 1014 is comprised
34 of a number of interconnected servers 1012 communicating
35 with each other using a common protocol (such as
36 TCP/IP). A user may communicate to another user by
37 using a computer 1010 that is connected to a server that
38 has a point of presence on the network. The user may
39 then send a mail message to another user having an

1 address at a computer connected to another server.
2 Under this paradigm, computers are needed at both ends
3 of the communication link and the costs for the
4 computers may be quite high. Additionally, local area
5 network (LAN) is used extensively in the corporate
6 environment to connect the user's computer to the mail
7 server. The LAN allow the user's computer to
8 communicate to mail server in real time which acts like
9 a local post office in the e-mail world. Real time
10 communication between the user computer and the server
11 allows e-mail messages be sent and received in a timely
12 manner. However, LAN or any existing real time network
13 is expensive and difficult to install for small
14 businesses and households. In these situations, a phone
15 line (voice or ISDN) is used for most people to
16 communicate with the mail server from their home
17 computers. This approach reduces the cost at the price
18 of real time connection. Without real time
19 communication, the communication efficiency and
20 convenience is greatly reduced.

21 Referring to Fig. 12, an e-mail messaging system of
22 the present invention utilizing the existing internet
23 infrastructure is presented. The user can use a low
24 cost e-mail messaging device 1018 to communicate with a
25 mail server 1016 or another e-mail messaging device
26 1018. The device in accordance with one embodiment of
27 the present invention is simply a low cost stand alone
28 device capable of receiving a notification that one or
29 more e-mail messages have been received at the local
30 server 1016 waiting for retrieval. The device also is
31 capable of identifying an incoming signal as an e-mail
32 message signal, receives the incoming e-mail messages
33 and stores them. Moreover, the device can provide the
34 needed functional components for the user to compose an
35 e-mail message and deliver the e-mail message to the
36 local server or another e-mail device directly. The e-
37 mail device uses minimum set of electronic components
38 and consumes very low power when compared to the power
39 consumption of a computer. It can be left on like an

1 answer machine. There are also other possible
2 embodiments of the e-mail device.

3 Fig. 13 illustrates the preferred hierarchy for the
4 e-mail messaging system. At the top level, there is a
5 main server 1020 receiving e-mail messages from the
6 internet network and sending e-mail messages originated
7 from the client e-mail devices to the network. The main
8 server may be one or more computers sharing a
9 centralized database. The main server 1020 distributes
10 and receives e-mail messages from a number of regional
11 servers 1022. Each regional server 1022 is designated
12 to serve a particular geographical area and serves one
13 or more local servers 1024. The local servers 1024
14 interact with the client e-mail devices 1026 within its
15 geographical area. The client device is designated to
16 be a simple, low-cost electronic device suitable for
17 home or business use, and it is further described infra.

18 To illustrate the message flow, the main server
19 1020 receives an e-mail message, identifies the e-mail
20 address, determines the regional server 1022 for this e-
21 mail message, and sends it to the corresponding regional
22 server 1022. The regional server may be designated to
23 serve a city or a greater metropolitan area involving
24 several area codes. After it receives a message, it
25 forwards the message to the local server. A local
26 server is designated for each sub-region and directly
27 serves the clients and their e-mail devices.

28 Implementation wise, a regional server and a local
29 server may be logically separate systems residing on the
30 same physical machine. Each local server is equipped
31 with the necessary hardware and software to communicate
32 with clients' e-mail devices.

33 In an alternate embodiment, referring to Fig. 14,
34 the main server 1020 may communicate directly with local
35 servers to send and receive e-mail messages to and from
36 the client e-mail devices.

37 Although the illustrated embodiments show a
38 hierarchial structure, it is within the scope of the
39 present invention to implement the present invention in

1 a distributive structure.

2 In order to provide direct e-mail messages to each
3 client, each client is identified by an unique e-mail
4 address, and must be registered with the e-mail system
5 in order for the e-mail system to interact with the e-
6 mail device. Typically, the e-mail device is accessed
7 via a local telephone line such as a voice, data or ISDN
8 line.

9 Fig. 15 illustrates the steps for the registration
10 process where an e-mail device (as operated by the
11 client) dials a toll-free number, logs on the main
12 server, and the main server performs the illustrated
13 steps. First, the main server requests and obtains the
14 machine identification number unique to the particular
15 e-mail device. The machine identification number
16 identifies the device type and also provides for theft
17 prevention. Secondly, the main server gets the security
18 code (password) entered by the user. The use of a
19 security code minimizes the possibility that the mail
20 messages being delivered or received by the wrong party.
21 Next, the main server fetches the notification code from
22 the e-mail device. The notification code is an optional
23 ringing protocol used by the main server to provide a
24 notice to the e-mail device through the use of ring
25 tones without incurring telephone toll charges.

26 The phone number for connecting to the e-mail
27 device is provided to the main server. For the given
28 phone number, the main server finds the corresponding
29 local server and its phone number, and sends this phone
30 number to the e-mail device. The e-mail device stores
31 it in its memory for future use. Finally, the main
32 server completes the registration process by completing
33 and inserting a new client information entry into the
34 centralized database.

35

36 Main Server

37 To track information on the clients, the local
38 servers, and the regional servers, two tables are
39 maintained by the main server. In table one, each

1 client's name, phone number, e-mail address, the local
2 server for the client, and other administrative or
3 accounting information are kept.

4 TABLE 1

5

Client Name	E-Mail Addr	Local Server	Phone Number	Other Info.
John Smith	jsmith	1	(210) 231-1234	
Bob Clinton	bclinton	1	(210) 231-7890	
Al Goodman	agoodman	2	(123) 789-1234	
Mike White	mwhite	2	(123) 789-4321	

10

11 Table two contains information for each local
12 server, information such as the address of the regional
13 server for the local server and the type of connection
14 from the main server to the regional server.

15 TABLE 2

16

Local Server	Regional Server Address (e-mail)	Connection Type
1	system@region1.com	Internet
2	postmaster@region2.com	(210) 111-1234 (leased line)

18

19
20 For example, there are two local servers illustrated in
21 table two. The regional server for local server one is
22 connected to the main server via the internet, and the
23 regional server for local server two is connected to the
24 main server via a leased line for high speed
25 communication. Other types of connection methods
26 between the regional servers and the main server can be
27 utilized as well (e.g. satellite) if they are
28 economically feasible. Additional tables can be created
29 and maintained as needed.

30 For the purpose of organizing incoming e-mail
31 messages, a mailbox is dedicated to each client and
32 maintained by the main server. The mailbox can be a
33 file or any other type of indexable storage system.

34 Referring to Fig. 16a, the main server is

1 instructed to check for and process incoming and
2 outgoing mail messages every x minutes where x is a
3 defined period of time which can be a function of the
4 load on the system.

5 Referring to Fig. 16b, the steps for processing
6 outgoing mail messages are illustrated. Outgoing mail
7 messages come from clients of the e-mail system for
8 delivery to other users on the net. This process is
9 performed every so often to ensure mail is processed in
10 a timely manner. If there is a new mailbag from a local
11 server, the new mailbag is decompressed, and the mail
12 messages are extracted from the mailbag and passed to
13 the send mail utility. The send mail utility can be a
14 common mail program (e.g. Unix Operating System sendmail
15 utilities) with the capability of sending and receiving
16 e-mail messages.

17 Fig. 16c illustrates the steps for processing
18 incoming mail messages where a mailbag is prepared for
19 each local server. The local servers are indexed
20 consecutively starting with index equals one 1030. For
21 each local server, a new mailbag is initialized 1032.
22 For each client serviced by the particular local server,
23 the client's mailbox is searched, and new messages are
24 extracted and appended to the mailbag for the particular
25 local server 1034. The new mail messages are then
26 deleted from the mailbox for the client 1034.

27 If the mailbag is not empty, the mailbag is
28 compressed, and a confirm flag is set 1038. If the size
29 of the mailbag after compression is greater than the
30 maximum size allowed for mail delivery, the mailbag is
31 split into two or more smaller mailbags. A copy of the
32 mailbag(s) is then stored in a To-Be-Confirmed directory
33 for later confirmation, and the mailbag(s) is sent to
34 the regional server for the particular local server.

35 After all of the mailboxes for a particular local
36 server have been processed, the process repeats until
37 all of the local servers' mailbags have been processed.

38 The main server also performs a confirmation
39 process to ensure that the mailbags and the individual

1 mail messages have been received. Referring to Fig.
2 16d, the steps for the confirmation process is
3 illustrated. Every so many minutes, the confirmation
4 process is executed. For each confirm flag that is set
5 (confirm [i]=true), the main server searches for a
6 confirmation message from the corresponding local
7 server. If a confirmation message is found and not all
8 the mail messages have been delivered and the elapsed
9 time is greater than the maximum allowed elapsed time,
10 the undelivered mail message is placed in an undelivered
11 mail directory and the operator is notified. If the
12 confirmation message is not found and the elapsed time
13 has exceeded a maximum allowed elapse time, the operator
14 is notified. If all the mail messages are confirmed as
15 successfully delivered, the mail bag is placed into
16 archive.

17

18 Regional Server

19 The function of the regional server is to serve as
20 an intermediary between the main server and the local
21 servers. The regional server is configured to have the
22 function of an ISP Point-of-Presence (like an internet
23 service provider) in order to receive and send mail via
24 the internet. It maintains a shell account and a
25 mailbox for each of the local server it serves. The
26 regional server interacts with its local servers to
27 facilitate the handling of incoming and outgoing
28 mailbags. The mail utilities commonly available with
29 the operating system (e.g. Unix) of the regional server
30 can be utilized to achieve the tasks described.

31 The regional server can be configured to operate as
32 a local server as well.

33

34 Local Server

35 Each local server maintains a table of clients.
36 For each client, referring to Table 3, the client's
37 name, e-mail address, phone number, notification type,
38 ringing protocol, security code, machine ID, and other
39 miscellaneous information are kept.

TABLE 3

Name	E-Mail Address	Phone Number	Notification Type	Ringing Code	Security Code	Machine ID
John Smith	jsmith	(210) 231-1234	notify-only	0.5/ 0.25	123	789
Bob Clinton	bclinton	(210) 231-7890	call-back	0.3/ 0.5	456	111

There are three notification/delivery types: notify-only, call-back mail delivery, and direct mail delivery. In the notify-only notification method, the local server calls the client's e-mail device using the specified ringing protocol from the table. No connection is actually made between the local server and the e-mail device. The rings are set up in such a manner that the e-mail device is programmed to recognize the ring pattern and determine that a notification is being delivered by the local server. When the notification is successfully received, the e-mail device activates an indicator light on the e-mail device. The client/user can then retrieve the message at his or her convenience using the e-mail device or other means. If in the process of notifying the e-mail device, an actual connection is made, the e-mail device can be set to call the local server to retrieve the e-mail messages or messages can be directly delivered.

In the call-back mail delivery method, similar to the notify-only method, the ringing protocol is used to notify the client's e-mail device that there is one or more e-mail messages waiting at the local server. The notification causes the e-mail device to call the local server and retrieve the e-mail messages.

In the direct mail delivery method, the local server calls the e-mail device, connects with the e-mail device, and delivers the e-mail messages to the e-mail device. The client may designate any one of the three notification methods as long as it is supported by the

1 e-mail device and the local server.

2 The optional ringing protocol is a method for the
3 local server to provide notice to the e-mail device
4 without incurring toll charges. It utilizes and
5 controls the length of ring time and the length of time
6 between rings. Using this method, a calling device
7 (here the local server) dials the number, detects ring
8 tone for x_1 second(s), hangs up, waits for w_1 second(s),
9 dials the number again, detects ring tone for x_2
10 second(s), and hangs up. The receiving device (here the
11 e-mail device) upon detecting this particular ringing
12 protocol determines that a notice is being delivered by
13 a calling device, and accordingly executes a
14 preprogrammed routine (if any). The ringing procedure
15 of dial, detect, hang up, and wait is not limited by a
16 specific number of iterations and may be repeated a
17 number of times. In the preferred embodiment, this
18 procedure is repeated three times, using x_1 , x_2 , x_3 and
19 w_1 , w_2 . The method may be simplified by setting w_1 and
20 w_2 to have the same length of time. Other combinations
21 are possible as well as long as the e-mail device is
22 configured to detect and recognize the designated
23 ringing protocol. In the preferred embodiment of the
24 present invention, a ringing code, n/m , is used for each
25 client where x_1 is a constant, x_2 equals x_1+n , and x_3
26 equals x_1+n+m . Referring to Table 3, for client John
27 Smith, a ringing code of 0.5/0.25 refers to x_2 being
28 $x_1+0.5$ second and x_3 being $x_1+0.5+0.25$ second, where w_1
29 and x_1 are constants. Similarly, the ringing code for
30 Bob Clinton is 0.3/0.5 which refers to x_2 being $x_1+0.3$,
31 and x_3 being $x_1+0.3+0.5$, and w_1 and x_1 again being
32 constants. Generally speaking, the ringing tone should
33 not be very long. Note that generally speaking it is
34 more reliable to use the difference between ring tones
35 rather than timing the duration of each ring tone.

36 In utilizing the ringing protocol with
37 communication switching devices in a central office
38 where a switching device passes back a signal informing
39 the calling device that the switching device is dialing

1 and ringing the line, once the calling device receives
2 such a signal, the calling device can determine the
3 length of ring time and hang up accordingly. Other
4 implementation of the above described method can be
5 applied to other types of calling devices and/or
6 switching devices as well.

7 A security code (client password) may be set by the
8 client to provide additional security measures. In
9 order to protect the e-mail device itself from theft (as
10 well as the e-mail messages) a machine identification
11 number (serial number) particular to each machine is
12 used. Thus, if the e-mail device is ill-gotten by
13 another, it will not work. The machine ID also allows
14 the local server to identify the e-mail device machine
15 type.

16 In facilitating mail delivery, the local server
17 interacts with the regional server/main server and
18 clients' e-mail devices.

19 In interacting with the regional server, referring
20 to Fig. 17a, the local server checks for one or more new
21 mailbags from the regional server every x minutes. If a
22 new mailbag is found, the mailbag is decompressed, mail
23 messages are extracted from the mailbag and placed into
24 the mailbox for the particular client.

25 Referring to Fig. 17b, every so often each client's
26 mailbox is checked to see if there are any e-mail
27 messages need to be delivered. If the mailbox for the
28 particular client is not empty, the e-mail message(s) in
29 the mailbox is delivered via the designated
30 delivery/notification method for the particular client,
31 i.e., one of the available delivery/notification
32 methods. For each of the delivery/notification methods,
33 there is a corresponding procedure call.

34 For the notify-only method, referring to Fig. 17c,
35 the last time the local server interacted with the
36 client's e-mail device (logon time) is fetched. If no
37 new mail has arrived since the last logon time, the
38 process ends. If there is one or more new e-mail
39 messages and no notification has been sent to clients'

1 e-mail devices yet, the ringing protocol described above
2 is applied. First the local server calls the client's
3 e-mail device. If the client's phone line is busy, the
4 local server waits a few minutes before attempting to
5 call the e-mail device again. If the phone line is not
6 busy, the local server, through its interfacing
7 hardware, detects the ring tone for x1 period of time
8 and hangs up, wait w1 period of time, and calls the e-
9 mail device again. If the line is busy, the process
10 starts over after waiting a certain period of time.
11 Otherwise, the local server detects ring tone for x2
12 period of time and disconnects. The local server calls a
13 third time, rings for x3 period of time and hangs up.
14 This completes the notification process.

15 For the call-back mail delivery method, referring
16 to Fig. 17d, the above described notification process is
17 used, and the local server sets the hardware
18 communication device in auto answer mode. If the
19 client's e-mail device calls back before the end of a
20 specified time period, a handshaking process is executed
21 to verify the security code and the machine code. Then,
22 any outgoing mail messages is retrieved from the e-mail
23 device and any incoming mail is delivered to the e-mail
24 device. When the file exchange process is completed,
25 the line is disconnected, a confirmation signal on the
26 successful delivery of the e-mail messages is sent to
27 the main server via the regional server, and any
28 outgoing mail messages is sent to the main server via
29 the regional server as well. If the e-mail device does
30 not call back after a set period of time and if the try-
31 counter (that keeps count the number of tries) exceeds a
32 maximum try value for the delivery of the messages, it
33 is deemed that mail delivery has failed and an error
34 messages is generated and sent to the regional server to
35 forward to the main server. Otherwise, the try-counter
36 is incremented and the program flow starts from label 2
37 again to repeat the process.

38 For the direct mail delivery method, referring to
39 Fig. 17e, a try-counter is initialized and the local

1 server calls the client's e-mail device. If the e-mail
2 device fails to respond, the try-counter is incremented;
3 and if the try-counter is greater than a maximum try-
4 counter value, an error is deemed to have occurred and
5 an error message is generated and sent to the server.
6 Otherwise, the process is repeated by branching off to
7 label 3. If the e-mail device responds, the process for
8 handshaking, exchanging of any outgoing and any incoming
9 e-mail messages, sending of a confirmation signal, and
10 sending of any outgoing mailbag as above described for
11 the call-back mail delivery process is executed.

12 In the handshaking process, referring to Fig. 17f,
13 the security code is first verified. If the security
14 code is incorrect, the handshaking process stops and
15 down stream procedures are not executed. This condition
16 is reported to the regional server and the main server
17 for special handling. The machine ID verification
18 process of the e-mail device is similar to the security
19 code verification process.

20 In the exchange-mail-files process, referring to
21 Fig. 17g, the local server connects to the e-mail device
22 and retrieves any outgoing mail from the e-mail device.
23 Next, the amount of available storage in the e-mail
24 device is determined. If the size of the incoming mail
25 messages is greater than the available storage size, the
26 incoming mail messages are repackaged. The repackaged
27 incoming mail is then sent to the e-mail device, and the
28 process ends. In repackaging the incoming mail
29 messages, referring to Fig. 17h, the incoming mail
30 messages are sorted in order of priority where priority
31 is determined by factors such as the priority code of
32 the message and the date and time stamp of the message.
33 The ordered messages are then selected in order of
34 priority up to the available storage space but leaving
35 space for a system e-mail message to the client that
36 there are additional messages waiting for retrieval or
37 delivery.

38 A priority code of the present invention can be
39 included as part of the e-mail address itself by

1 comparing a number in the e-mail address itself to the
2 security code. For example, for jsmith@emailsys.com
3 having a security code of "124", an e-mail address such
4 as "jsmith_123@emailsys.com" would have a higher
5 priority than an e-mail address such as
6 "jsmith_456@emailsys.com" because the number "123" is
7 closer to the security code of "124" than the number
8 "456" is to "124". Thus, by having a single e-mail
9 address, the owner of the e-mail address can give out e-
10 mail addresses with different priority codes.

11

12 Client E-Mail Device - Software

13 The client's e-mail device has both a hardware
14 component as well as a software component. The e-mail
15 device can communicate with the local server, regional
16 server, main server, or another e-mail device (for peer-
17 to-peer communication).

18 Referring to Appendix A, the software pseudo-code
19 for the client's e-mail device is illustrated. When the
20 device is first turned on, a power-on self-test is
21 executed. If there is a fatal failure, the program flow
22 branches to the Fatal_Error_Stop label, sets the fatal
23 error indicator, and halts the system. If a minor
24 failure occurred, the program flow branches to the
25 Warning_Code label, sets a warning code indicator and
26 resumes the program flow. Next, the phone line status
27 is checked. If it is busy, the device will wait until
28 the line is not busy. The e-mail device is then placed
29 in auto-answer mode and the registers for the device are
30 initialized for operation. If there is any failure
31 during this initialization process, a warning code is
32 posted. After the initialization process, the software
33 continuously loops to check for an interrupt from the
34 interrupt registers. If an interrupt is found, the
35 program branches to the Interrupt_Service routine. The
36 Interrupt_Service routine reads the interrupt register,
37 determines the interrupt type, and branches to the
38 corresponding interrupt routine.

39 An interrupt may be caused by one of the several

1 subsystems, where the types of interrupts include
2 registration request interrupt, call-back mail delivery
3 interrupt, dial server interrupt (which calls the same
4 procedure as that of the call-back mail delivery
5 interrupt), incoming mail delivery interrupt, and
6 transfer-abort interrupt.

7 If the call-back interrupt flag is set, the call-
8 server routine is executed where the communication
9 module is set to dial the local server phone number and
10 execute an In_Mail routine.

11 The In-Mail routine first performs handshaking with
12 the local server communication module. It then sends
13 out any outgoing mail messages prepared by the client,
14 and requests and receives a confirmation signal from the
15 local server. If the confirmation signal from the local
16 server is incorrect, the outgoing mail messages are sent
17 again by branching the program flow to label SendM.
18 Otherwise, the device is instructed to receive incoming
19 mail messages. If the incoming mail messages are not
20 received correctly, a confirmation signal is generated
21 to sent to the local server which would cause the local
22 server to deliver the mail messages again. When the
23 messages are correctly received, the mail indicator is
24 set.

25 In the handshaking routine, the device receives the
26 security code from the local server, verifies the code,
27 and branches to the Bye routine if it is incorrect.
28 Similarly, the device receives the machine ID, verifies
29 the ID, and goes to the Bye routine if it is incorrect.
30 The device then sends the security code and the
31 available storage size to the local server.

32 Back to the Interrupt_Service routine, if the
33 Incoming_Mail interrupt flag is set, the program flow
34 branches to the In_Mail routine as described above.

35 If the Registration_Request interrupt flag is set,
36 this flag indicates that the client has placed the
37 device in registration mode in order to register with
38 the main server. This process is generally executed
39 when the device is being set up for the first time or

1 when the device has been moved to a new location. The
2 program flow branches to the Registration_Request
3 routine, where the device dials a designated phone
4 number for registration. Generally, this is a 800 toll
5 free number connected to the main server. When
6 connected, the device delivers the machine ID, the
7 security code, and the client's phone number to the main
8 server. The main server determines the particular local
9 server for serving the client's e-mail device based upon
10 the given phone number. The phone number for the
11 particular local server is sent to the client device,
12 and the client device retains the number in memory for
13 later use.

14 The dial_server interrupt flag is set by the client
15 to send and retrieve mail messages. Like the call_back
16 interrupt, it calls the call_server routine.

17 In the case where the local server is using the
18 direct mail delivery method, the Incoming-mail flag is
19 set and the In_Mail routine is executed as described
20 above.

21 In the case where a request has been made to
22 disconnect the line, the Transfer-Abort flag is set
23 which causes any phone connection to be disconnected.

24 In the case where the hardware for the e-mail
25 device is part of another computer system (e.g. personal
26 computer system) in the form of an expansion card or a
27 part of an expansion card, the interface with the e-mail
28 device can be integrated with a mail program of the
29 computer.

30

31 Client E-Mail Device - Hardware

32 The hardware component of the e-mail device may be
33 embodied in several different manners. In one form, the
34 e-mail device is a low-cost stand alone device directly
35 connected to the phone line before the phone line is
36 connected to other devices (e.g. answering machine, fax
37 machine, etc.). The stand-alone embodiment interacts
38 with the e-mail system as described above. More
39 particularly, the software for the e-mail device as

1 described above is configured and stored in the ROM of
2 the e-mail device.

3 In another hardware embodiment, the e-mail device
4 is an integral part of a computer expansion card having
5 power supplied from two sources, the computer system
6 itself or an external power supply. Referring to Fig.
7 18a, an expansion card 1050 having an edge connector
8 1052 is illustrated. The expansion card is insertable
9 into an edge connector slot connected to the bus of a
10 computer system. The expansion card includes a CPU 1054
11 (or microcontroller) directly polling an I/O register
12 1056 that is communicatively connected to a notification
13 module 1058. The I/O register 1056 receives information
14 from the notification module 1058 and the user input and
15 control device 1057 (which can be a keyboard, a keypad,
16 dip switches, etc.) for entering security code, e-mail
17 messages, or other inputs, and generates signals for
18 indicators 1059 to indicate the status of any messages
19 and the e-mail device. The notification module sends
20 and receives information via a phone line connection and
21 interacts with the communication module 1062. When the
22 expansion card is inserted into the computer system, a
23 bus controller 1064 controls the data flow to and from
24 the computer system (not shown) via the edge connectors
25 1052. Information is passed between the flash memory
26 1066, the ROM 1068, the RAM 1070, the CPU 1054, and the
27 communication module 1062 through an internal bus 1072.
28 The communication module can be a fax/modem chipset.
29 The expansion card 50 may be powered by one of two
30 sources, power from the computer system via trace 1074
31 or power from an external source via trace 1076 and
32 power jack 1078. The power switching and conversion
33 module 1080 detects power from one of the two sources,
34 performs any power conversion from one voltage level to
35 another voltage level if it is needed, and routes the
36 power to the components on the expansion card 1050. The
37 power detection and switching is automatically performed
38 without interruption to the operation of the e-mail
39 device. Thus, no interruption of operation would occur

1 if power is switched in the midst of sending or
2 receiving e-mail messages.

3 In this embodiment, when the computer system is on,
4 the expansion card may be controlled and operated by the
5 software of the computer system. When the computer
6 system is off, unattended, or not controlled by the
7 software of the computer system, the expansion card
8 obtains its power supply from an external source and
9 operates in accordance with the software described
10 above.

11 Mailing program on the computer system having the
12 e-mail expansion card would have software routes for
13 sending and retrieving e-mail messages between the
14 computer system and the e-mail expansion card.
15 Referring to Fig. 18b, the pseudo-code for the computer
16 system to retrieve e-mail messages from the expansion
17 card is illustrated. The status of the card is first
18 verified. If the card is not busy, the in-mail message
19 flag (indicating the existence of new e-mail messages)
20 is checked. If there is a new message, the message is
21 transferred to the computer system and the storage area
22 is cleared. Then, the message is displayed on the
23 computer screen of the computer system. Referring to
24 Fig. 18c, the pseudo-code for the computer system to
25 transfer prepared e-mail messages to the expansion card
26 for outbound is illustrated. If the card status is not
27 busy and if there is enough storage space to store all
28 of the e-mail messages, the e-mail messages are
29 transferred to the expansion card and the computer can
30 be turned off. If the storage on the card is
31 insufficient, the user is informed to wait until the
32 messages are sent before turning the computer off.

33 In yet another hardware embodiment, referring to
34 Fig. 19a, the communication module of Fig. 18a is a
35 commonly available external fax/modem. For an external
36 modem, its serial port 1086 may be connected to the
37 serial port of the computer system. The expansion card
38 1082 (now without the communication module) communicates
39 with the modem 1084 through serial port 1086. The

1 notification device may be connected to the modem via
2 standard phone jacks and a phone line 1088. In this
3 embodiment, the cost of the expansion board now without
4 the communication module is reduced. A phone line
5 signal would come in on jack 1090 and be processed in
6 the same manner as described above.

7 Fig. 19b illustrates the embodiment for an internal
8 modem where the e-mail expansion card 1082 is mounted on
9 the mother board 1083 and has a phone jack 1092 for
10 receiving the phone line and phone signal and a phone
11 jack 1093 for passing the phone signal to the modem card
12 1094 via phone line 1097. The modem card 1094 is
13 mounted on the mother board 1083 as well and receives
14 the phone signal at phone jack 1095 and passes the phone
15 signal out at phone jack 1096. The e-mail expansion
16 card directly communicates with the modem card via
17 ribbon 1098. Ribbon 1098 on one end is communicatively
18 attached to the expansion card 1082 and on the other end
19 it can be a ribbon cable inserted into a bus connector
20 slot 1105 of the mother board along with the modem card.
21 Fig. 19c shows that the ribbon cable 1098 at the end
22 having three contact surfaces 1099, 1101, and 1103.
23 Contact surface 1103 makes electrical contacts with
24 selected tabs on one side 1107 of the edge connector of
25 the modem card 1094 and selected tabs on one side of the
26 bus slot 1105. Contact surface 1101 makes physical
27 contact (but no electrical contact) with the bottom of
28 the bus connector slot 1105. Contact surface 1099 makes
29 electrical contact with selected tabs on the other side
30 of the edge connector of the modem card 1094 and
31 selected tabs on one side of the bus slot 1105. In this
32 manner, the modem card can communicate with the computer
33 system and the e-mail expansion card, and the e-mail
34 expansion card is allowed a greater amount of direct
35 control over the modem card. In the case where power is
36 being supplied by an external source, the power can be
37 supplied to the modem card through certain of the
38 selected tabs.

39 Note that in both Figs. 19a and 19b, the e-mail

1 expansion card optionally can have complete control over
2 the external or internal fax/modem where all
3 communication between the CPU and the fax/modem has to
4 pass through the e-mail expansion card. In another
5 word, the e-mail expansion card can encapsulate the
6 fax/modem. In Fig. 19b, encapsulating can be achieved
7 by providing a ribbon cable having printed traces on one
8 side and non-conductive material on the other side. The
9 modem card nevertheless is inserted into the bus slot
10 but it does not communicate through the traces in the
11 bus slot. Conventional methods can be applied as well
12 where the e-mail expansion card and the internal modem
13 card are connected via simple ribbon and connectors on
14 each card.

15 In yet another embodiment of the invention,
16 referring to Fig. 19d, the e-mail device 1130 is a
17 stand-alone card having an slot connector 1144 able to
18 receive a regular fax/modem card 1132. The e-mail
19 device has a connector 1138 for receiving ac or dc power
20 supply, a communication port 1136 (such as a serial
21 port), and a phone jack for receiving a phone line 1134
22 and also a jack for passing a phone signal to another
23 device 1135. Likewise, the fax/modem card 1132 has a
24 jack for receiving a phone signal 1142 and a jack for
25 passing through a phone signal 1143. This embodiment
26 can be placed in a physical box.

27 Further note that although the e-mail device is
28 illustrated as an expansion card it can be easily
29 converted into an external device like that of the
30 common external fax/modem device. Moreover, the
31 expansion card can be converted to a stand alone device
32 with a display. Moreover, communication devices are not
33 limited to the fax/modem devices illustrated above.
34 ISDN devices, cable modem, wireless modem, or other
35 communication devices can be used as communication
36 devices as well.

37 The hardware embodiment for implementing the
38 ringing protocol described above requires a tone
39 detection circuit. Referring to Fig. 20, on the local

1 server side, the local server provides the dialing and
2 answering functionalities 1052 through the use of a
3 modem 1057 or other communication devices or modules.
4 The modem controls the phone line 1055 to dial the
5 telephone number of the client's e-mail device, and the
6 tone detection circuit 1053 detects the ringing tone and
7 reports it to the local server 1056. The local server
8 determines the length of ringing time and instructs the
9 modem to disconnect when the predetermined period of
10 time has been reached.

11 On the client e-mail device end, the notification
12 device 1054 detects the ringing signal, the time lapsed
13 for each ringing signal and the time lapsed between the
14 signals. It then determines whether a valid
15 notification code has been received. Referring to Fig.
16 21, on the client side, the microcontroller 1058
17 operates a ringing signal detection circuit 1049 and a
18 modem 1047 in detecting whether a valid ringing code has
19 been received.

20

21 Integration of the E-Mail Device

22 The above described e-mail device may be integrated
23 into other devices. For example, the e-mail device may
24 be part of a phone, a fax machine, an answering machine,
25 etc. If the e-mail device is integrated with a fax
26 machine, e-mail messages can be readily printed out and
27 any outgoing mail messages may be composed through the
28 use of the numeric keypad. Fig. 22 illustrates one
29 embodiment of the e-mail device integrated with a fax
30 machine. In this embodiment, there is a transmitter
31 subsystem 1100, a receiver subsystem 1102, and a modem
32 1104 that can be connected to a telephone line 1106.
33 The modem incorporates a control module 1125 to execute
34 the ringing protocol described above and distinguishes a
35 fax/modem signal from an e-mail message signal (or
36 protocol) to activate the corresponding portion of the
37 circuitries.

38 The transmitter 1100 can process two signals, one
39 signal for faxing and one signal for mailing messages.

1 For faxing a document, the document is first scanned by
2 a scanner 1108 and the scanned signal is converted to a
3 digital format 1110. For mailing messages, the prepared
4 mail messages are stored in memory 1114 and converted to
5 raster graphic image 1126. Note that a number of
6 methods are available for composing mail messages,
7 including the use of a keyboard, a keypad, etc. The
8 composed messages are then stored in memory. A
9 multiplexer 1116 selects one of the two signals to pass
10 through to the compressor 1112 and then to the modem
11 1104 for transmission in accordance with the selected
12 mode.

13 The receiver subsystem 1102 processes incoming fax
14 signal or mail message signal. For a fax signal, the
15 signal is decompressed 1118 and sent to the printing
16 subsystem 1122 through a multiplexer 1120. For an e-
17 mail message signal, the signal is received and
18 processed by an integrated e-mail device (and software)
19 1124 as described above. The output from the e-mail
20 device is converted to image format 1126 and sent to the
21 printing subsystem 1122 via the multiplexer 1120.
22 Again, the multiplexer selects the signal to be sent to
23 the printing subsystem in accordance with the selected
24 mode.

25

26 REMOTE CONTROL OF THE SERVERS

27 The servers can be remotely operated and control by
28 using commercially available communication software or
29 tailored software. The ringing protocol may be used to
30 set and reset the servers. Appendix B illustrates one
31 set of pseudo-code for remote controlling the servers.
32 Referring to Fig. 23, the server computer 1210 is
33 connected to the network 1200 via a direct connection
34 1214 and through a modem 1212. The modem provides a
35 remote login path to the server in order to control or
36 maintain the server. If the server does not respond to
37 the remote login, the ringing protocol of the present
38 invention embodied in the notification device 1205 can
39 be used to detect ringing pattern. Upon receiving a

1 proper ringing pattern, the notification device sends a
2 signal to the server computer via line 1207 to prepare
3 for shut-down and a signal to the power control module
4 1206 to generate a pulse to toggle the relay 1202 for a
5 proper period of time to reboot the computer.

6 The software described herein for implementation of
7 the e-mail system can be written specifically for this
8 particular application in the programming language of
9 choice. It can also be implemented through the use of
10 existing system mail utility programs. For example,
11 under the Unix system, an entire set of mail utility
12 programs are available for the sending and receiving of
13 mail messages.

14 Although the present invention has been described
15 in terms of the presently preferred and second
16 embodiments, it is to be understood that such disclosure
17 including combinations of the two embodiments is not to
18 be interpreted as limiting. Various alterations and
19 modifications including the various combinations of the
20 two embodiments will no doubt become apparent to those
21 skilled in the art after reading the above disclosure.
22 Accordingly, it is intended that the appended claims be
23 interpreted as covering all alterations and
24 modifications as fall within the true spirit and scope
25 of the invention.

```
Client software codes on communication card or on a
stand alone system
Kernel
    POST (Power on self-test)
    If fatal failure, go to Fatal_Error_Stop
    If minor failure, go to Warning_code
    Check line status; if busy, wait until line is not
busy;
    Set up communication module in auto-answer mode
    Set up other I/O registers, devices
    If any failure, go to Warning_code
loop Polling interrupt
    If interrupt found, jump to Interrupt_service
    go to loop

Fatal_Error_Stop:
    set error indicator or display
    Halt

Warning_code: (input: warning code)
    set warning indicator (or display)
    return

Interrupt_Service:
    Read interrupt register
    Check the interrupt type

    case of:
        Call_back: jump to Call_server
        Registration request: jump to Reg_req
        Incoming_mail: jump to In_mail
        Dial_server: jump to Call_server
        Transfer_abort: jump to Tfr_abort
    end case:

    Clear the interrupt that has been serviced
    return

Call_server:
    set up communication module to dial
    read_server_number
    dial(phone)
    In_mail;
    return

Bye:
    hangup
    set up communication module in auto answer mode
    return

In_mail:
    Handshaking
sendM    send outgoing mail
         receive transfer confirm info.
         If confirmation info not correct, go to sendM
to retry
         send available storage size
revM    receive incoming mail
         send receive confirmation info
```

If confirmation info is not correct go to revM
set Mail_in indicator
return

Handshaking:

check the security code, if not correct, go to Bye
receive machine ID from server (if it is used)
check the machine ID, if not correct, go to Bye
return

Reg_req:

dial the (800) number
establish connection
display greeting
send machine ID
send security codes
echo the security code
print "enter your phone number"
read phone_number
send phone_number
receive and save local server number(s)
print "registration done"
return

Tfr_abort:

save all data for immediate disconnection
hangup
return

APPENDIX B

Remote monitor and control of the local server

{ Codes for every local server }

Program diag_report;

begin

Do the following every hour

begin

run_diagnostics_and log results

check any problem

mail the report to the main server

end

end

{ Codes on main server }

Program remote_monitor;

begin

Do the following for every hour

begin

get_new_mail: //the mail are diag report from

local server

if there is mail

begin

check the report from each local server

if there is a problem

begin

remote_dia_ctrl: //reference point

rlogin local server //remote login & run

diag.

if rlogin fail goto cold_boot

run more extensive diagnostics

if the problem is correctable correct the

program

else reboot //(software warmboot)

begin

wait for reboot;

rlgin local server

if rlogin fail goto cold_boot

if system is okay, exit

else

begin

cold_boot:

remote_shutdown_process (n,m);

//hardware cold boot

// n,m are the secret code like

notification device

wait for reboot

rlgin local server

if system is okay, exit

else report problem to operator

end

end

else

if it is too long for not receiving mail

begin

rlogin the local server

```
        go to remote_dia_ctrl
      end
    end
  end
```

{ The remote shutdown process uses a method similar to the notification device, but it requires much higher security in order to prevent unauthorized shutdown. So, the following procedure uses two codes instead of one code. Again the code represents the ring tone length difference for two consecutive dialings. The first code n is for the difference between the ringing period of the first call x1 and the second call x2, and m is for the difference between x2 and the ringing period of the third call x3. Typically, n and m are small numbers which can be positive or negative numbers. More codes can be used to achieve even greater security.}

```
process remote_shutdown_process (n,m);
begin
  start_point;    //just a reference point
  call (phone_number)
    if line busy, wait and go to start_point
  detect_ring_tone for x1 second
  disconnect;
  wait w1 seconds;
  call (phone_number);
    if line busy, wait and go to start_point
  detect_ring_tone for x2 second    //x2=x1+n
  disconnect
  wait w1 seconds;
  call (phone_number);
    if line busy, wait and go to start_point
  detect_ring_tone for x3 seconds    //x3=x2+m
  disconnect;
end
```

CLAIMS

I claim:

- 1 1. A telephonic electronic message apparatus for
2 automatically receiving electronic messages comprising:
3 a means for adapting to an existing telephone line
4 for receiving said electronic messages; and
5 a processing means for automatically responding to
6 said electronic messages and for storing said messages
7 therein whereby said electronic messages may be received
8 and stored without requiring a human operation.
- 1 2. The telephonic apparatus of claim 1 further
2 comprising:
3 an user interface means for providing information
4 to an user relating to a reception of said electronic
5 messages.
- 1 3. The telephonic apparatus of claim 2 further
2 comprising:
3 a telephone adapting means for connecting to a
4 telephone;
5 said processing means further including a telephone
6 interface means for detecting an incoming signal
7 received from said telephone line and for determining if
8 said incoming signal being an electronic message and for
9 transmitting said incoming signal to said telephone when
10 said incoming signal being detected is determined not an
11 electronic message.
- 1 4. The telephonic apparatus of claim 2 wherein:
2 said user interface means further including a
3 display means for displaying a message relating to the
4 reception of said electronic messages.
- 1 5. The telephonic apparatus of claim 2 wherein:
2 said processing means further including a message
3 storage means for storing said electronic messages
4 therein.

- 1 6. The telephonic apparatus of claim 3 further
2 comprising:
3 an electronic message exporting means for
4 delivering said electronic messages via a transmitting
5 means to a receiving device.
- 1 7. The telephonic apparatus of claim 6 wherein:
2 said electronic message exporting means including a
3 television interface means for delivering said
4 electronic messages via said transmitting means to
5 a television for displaying said electronic
6 messages thereon.
- 1 8. The telephonic apparatus of claim 7 wherein:
2 said user interface means further including an
3 message exporting control means for controlling a
4 display of said electronic message on said television.
- 1 9. The telephonic apparatus of claim 3 further
2 comprising:
3 an automatic registration means for storing
4 required registration data therein and for automatically
5 dialing and registering with a network server for
6 receiving said electronic messages therefrom.
- 1 10. The telephonic apparatus of claim 3 further
2 comprising:
3 a removable data storage means for storing said
4 electronic messages therein for removably transferring
5 said electronic messages therefrom.
- 1 11. The telephonic apparatus of claim 5 further
2 comprising:
3 a message full means for terminating a reception of
4 said electronic messages when said message storage means
5 reaching a full storage capacity.
- 1 12. The telephonic apparatus of claim 3 further
2 comprising:

1 a message screen means for detecting designated
2 message identifications in said electronic messages for
3 receiving and storing said electronic messages with said
4 designated message identifications.

1 13. The telephonic apparatus of claim 3 further
2 comprising:

3 an automatic logon means for automatically dialing
4 and logging on a network server periodically for
5 receiving said electronic messages therefrom.

1 14. The telephone apparatus of claim 4 wherein:

2 said user interface means further including a
3 display control means including control buttons for
4 controlling the display of different electronic
5 messages.

1 15. A telephonic electronic message apparatus for
2 automatically receiving electronic messages comprising:

3 a means for adapting to an existing telephone line
4 for receiving electronic messages including digitized
5 signals therefrom;

6 a processing means for automatically responding to
7 said electronic messages wherein said processing means
8 further including a message storage means for storing
9 said electronic messages therein;

10 an user interface means including a display means
11 for displaying information to an user relating to a
12 reception of said electronic messages, said user
13 interface control means further including a display
14 control means including control buttons for controlling
15 the display of different electronic messages;

16 a telephone adapting means for connecting to a
17 telephone;

18 said processing means further including a telephone
19 interface means for detecting an incoming signal
20 received from said telephone line and for determining if
21 said incoming signal being an electronic message and for
22 transmitting said incoming signal to said telephone when

1 said incoming signal being detected is determined not an
2 electronic message;

3 an electronic message exporting means for
4 delivering said electronic messages via a transmitting
5 means to a receiving device wherein said electronic
6 message exporting means including a television interface
7 means for delivering said electronic messages via said
8 transmitting means to a television for displaying said
9 electronic messages thereon;

10 said user interface means further including an
11 message exporting control means for controlling a
12 display of said electronic message on said television;

13 an automatic registration means for storing
14 required registration data therein and for automatically
15 dialing and registering with a network server for
16 receiving said electronic messages therefrom; and

17 a message full means for terminating a reception of
18 said electronic messages when said message storage means
19 reaching a full storage capacity.

1 16. The telephonic apparatus of claim 15 further
2 comprising:

3 a message screen means for detecting designated
4 message identifications in said electronic messages for
5 receiving and storing said electronic messages with said
6 designated message identifications.

1 17. The telephonic apparatus of claim 16 further
2 comprising:

3 a removable data storage means for storing said
4 electronic messages therein for removably transferring
5 said electronic messages therefrom.

1 18. The telephonic apparatus of claim 15 further
2 comprising:

3 an automatic logon means for automatically dialing
4 and logging on a network server periodically for
5 receiving said electronic messages therefrom.

1 19. The telephonic apparatus of claim 15 wherein:
2 said telephonic apparatus being provided for
3 receiving a plurality of message units; and
4 said user interface means including a message unit
5 access Control means for controlling an access to each
6 of said plurality of message units.

1 20. A method for providing communication between a
2 local electronic message server and a telephone user
3 connected with telephone line to the server comprising
4 the steps of:
5 (a) providing a telephonic electronic message
6 apparatus (which including a means for adapting)
7 adaptable to said telephone line for receiving
8 electronic messages from said local server; and
9 (b) providing a processing means for said
10 telephonic electronic message apparatus for
11 automatically receiving electronic messages for storing
12 said messages therein whereby said electronic messages
13 may be received and stored without requiring a human
14 operation.

1 21. An electronic message communication system
2 comprising:
3 a local electronic message server connected to an
4 internet system for receiving said electronic messages
5 therefrom and sending said electronic messages thereto;
6 a telephonic electronic message apparatus connected
7 to said local electronic message server by a telephone
8 line wherein said telephonic electronic message
9 apparatus includes a means for adapting to said
10 telephone line; and
11 said telephonic electronic message apparatus
12 further includes a processing means for automatically
13 receiving said electronic messages transmitting from
14 said local server through said telephone line for
15 storing said messages in said telephonic electronic
16 message apparatus whereby said electronic messages may
17 be received and stored without requiring a human

1 operation.

1 22. The electronic message communication system of
2 claim 21 wherein:

3 said telephonic electronic message apparatus
4 includes a registration trigger means and an automatic
5 registration dial-up means for automatically sending a
6 plurality of identification messages to said local
7 server for registration upon an actuation of said
8 registration trigger means; and

9 said local electronic message server includes a
10 registration processing means for receiving said
11 plurality of identification messages for processing a
12 registration Of said telephonic electronic message
13 apparatus in said local server.

1 23. The electronic message communication system of
2 claim 21 wherein:

3 said telephonic electronic message apparatus
4 includes an auto collect triggering means and an collect
5 dial-up means for automatically sending a plurality of
6 auto collect messages to said local server upon an
7 actuation of said auto collect trigger means; and

8 said local electronic message server includes an
9 auto collect processing means for receiving and
10 responding to said plurality of auto collect messages
11 for automatically sending a plurality of electronic
12 messages to said telephonic electronic message
13 apparatus.

1 24. The electronic message communication system of
2 claim 21 wherein:

3 said local electronic message server includes an
4 message priority processing means for checking a
5 priority of each of said electronic messages and for
6 sending each of said electronic messages to said
7 telephonic electronic message apparatus according to
8 said priority.

1 25. The electronic message communication system of
2 claim 21 wherein:

3 said local electronic message server includes a
4 storage capacity processing means for checking a storage
5 capacity of said telephonic electronic message apparatus
6 and for sending said electronic messages thereto
7 according to said storage capacity whereby a message
8 overflow of said telephonic electronic messages
9 apparatus may be prevented.

1 26. The electronic message communication system of
2 claim 22 wherein:

3 said automatic registration dial-up means provided
4 for automatically sending a plurality of said
5 identification messages including a telephone number, a
6 machine number and a user password.

1 27. A method for sending and receiving electronic mail
2 messages over an interconnected network of computers
3 where one of said interconnected computers is configured
4 to receive mail messages having a particular domain
5 address, said configured computer electronically
6 connected to one or more mail servers each designated
7 for a particular geographical region and each
8 electronically connected to one or more electronic mail
9 messaging devices each having a particular address
10 within said domain address for receiving electronic mail
11 messages addressed to said particular address, wherein
12 each of said devices contains dedicated electronic
13 circuitries for sending, receiving, and storing
14 electronic mail messages, said method comprising the
15 steps of:

16 receiving one or more electronic mail messages each
17 addressed to a particular address within said domain
18 address;

19 determining the mail server for delivering each of
20 the electronic mail messages in accordance to their
21 respective particular addresses;

22 packaging the electronic mail messages for a mail

- 1 server into a mailbag for delivery;
- 2 sending said mailbag to said mail server;
- 3 unpackaging said mailbag and reconstructing the
- 4 electronic mail messages from said mailbag at said mail
- 5 server; and
- 6 delivering each of the electronic mail messages to
- 7 the corresponding electronic mail messaging devices.

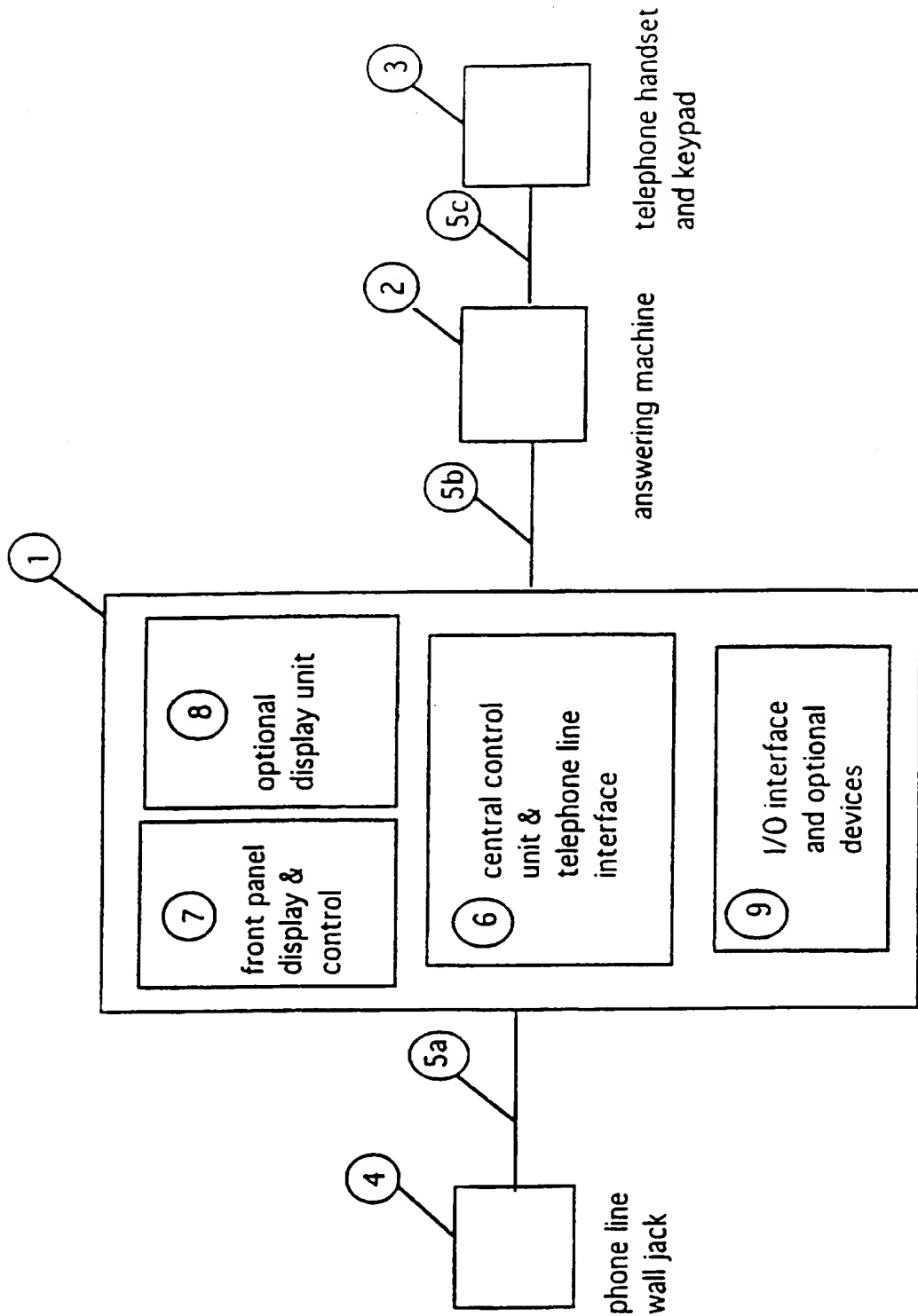


Fig. 1 connection of E-mail apparatus and telephone & answering machine

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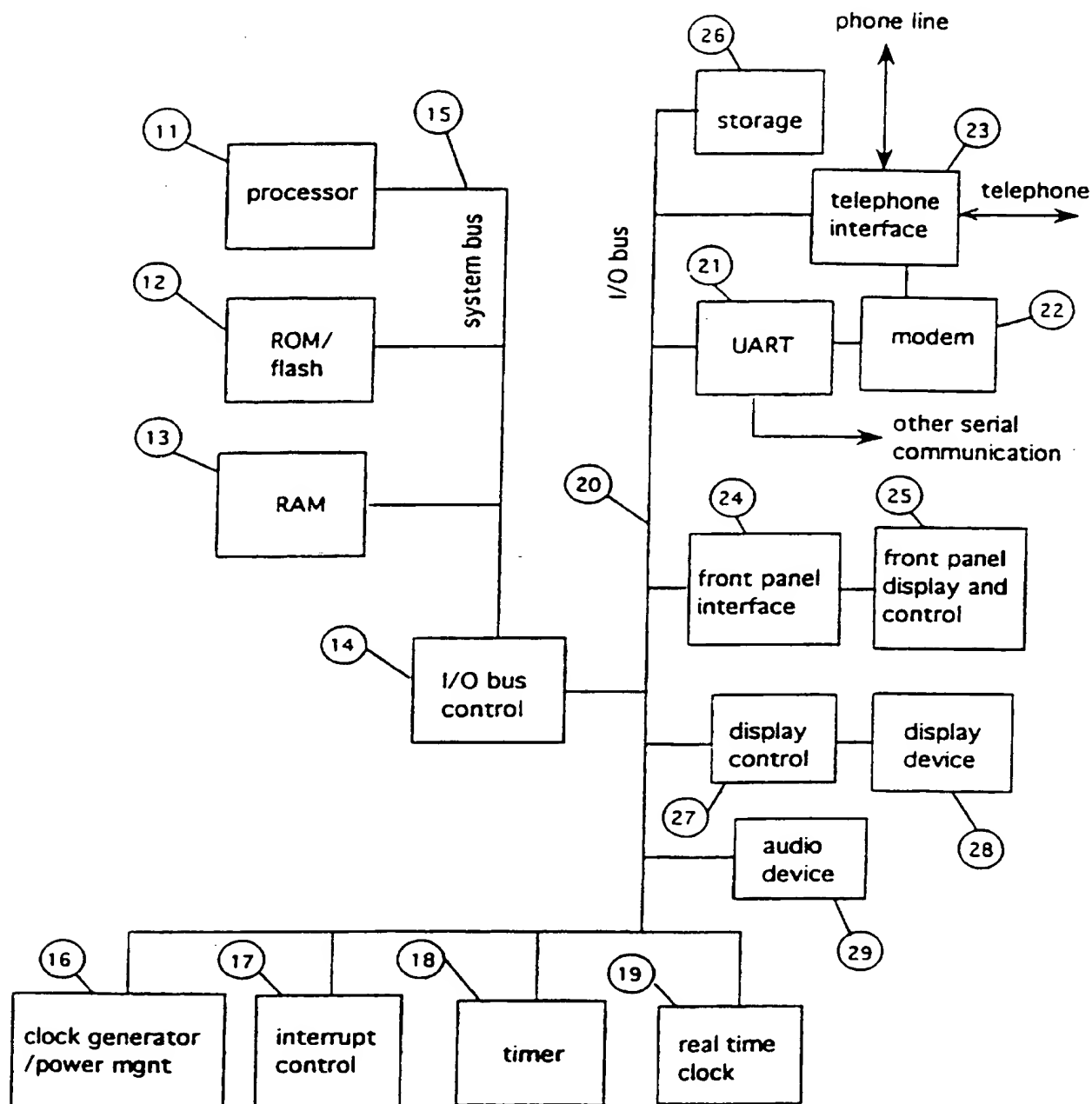


Fig 2. Block diagram of the E-mail apparatus

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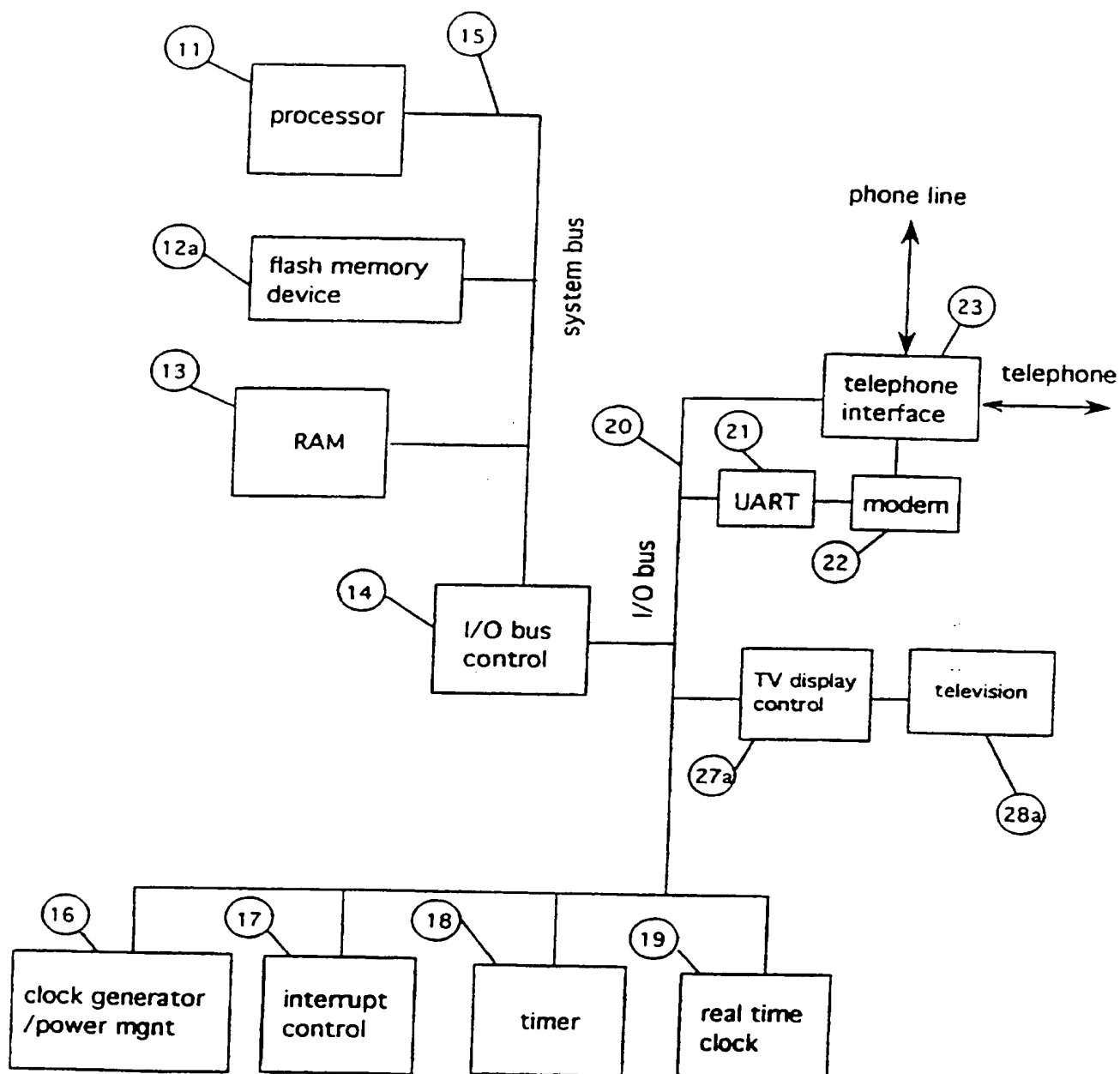


Fig 2a. Example of the E-mail apparatus implementaiton

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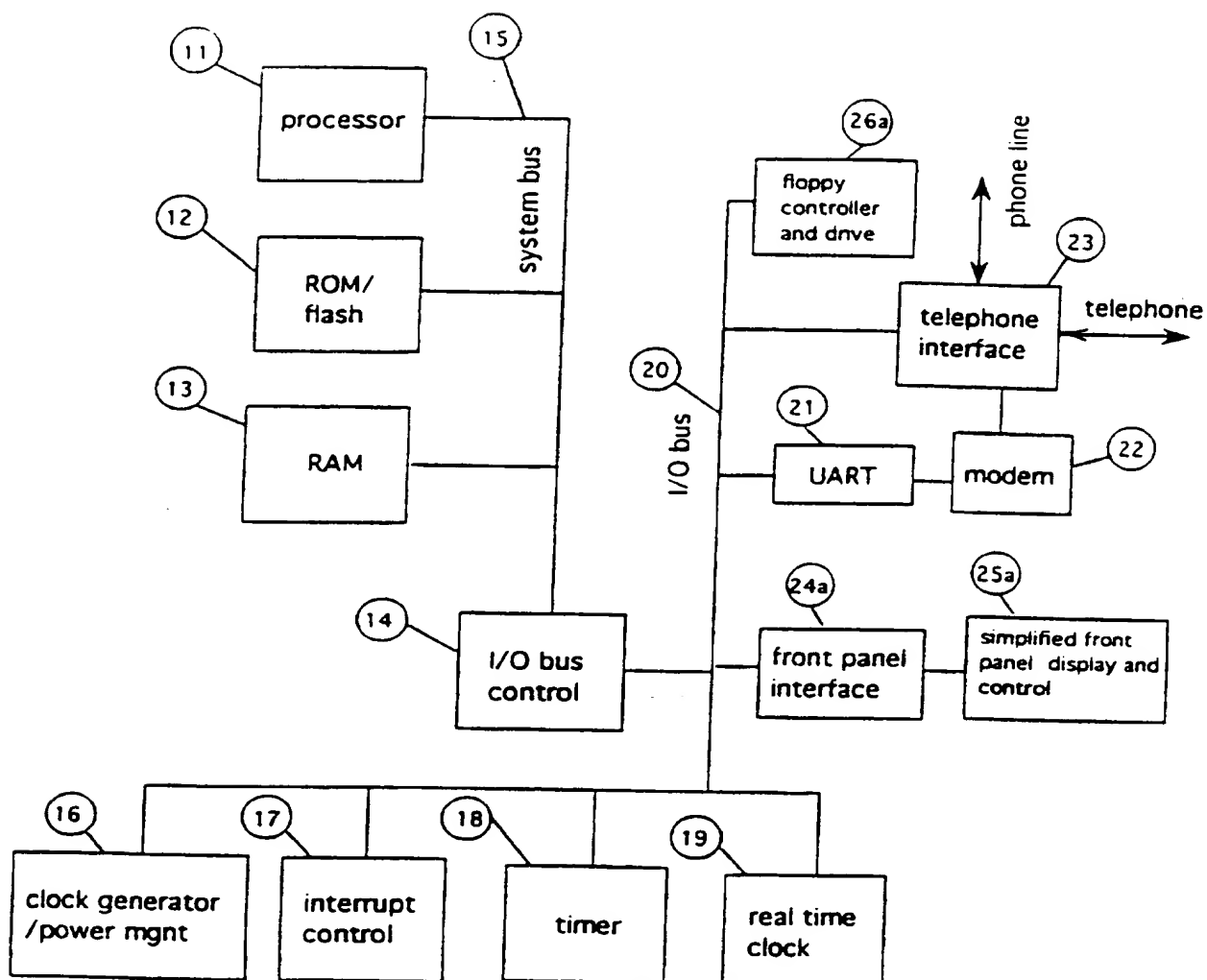


Fig 2b. Example of the E-mail apparatus implementation

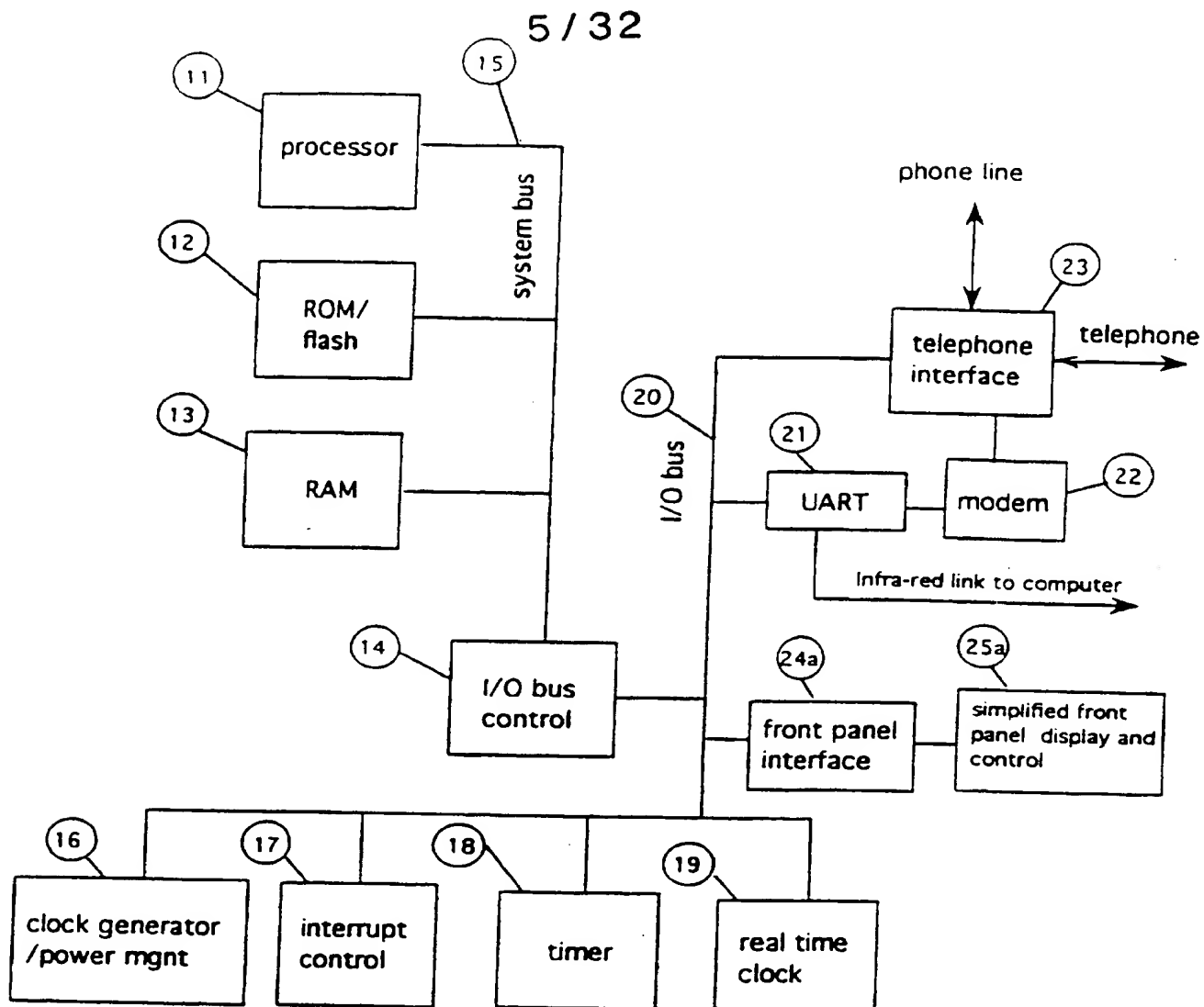


Fig 2c. Example of the E-mail apparatus implementation

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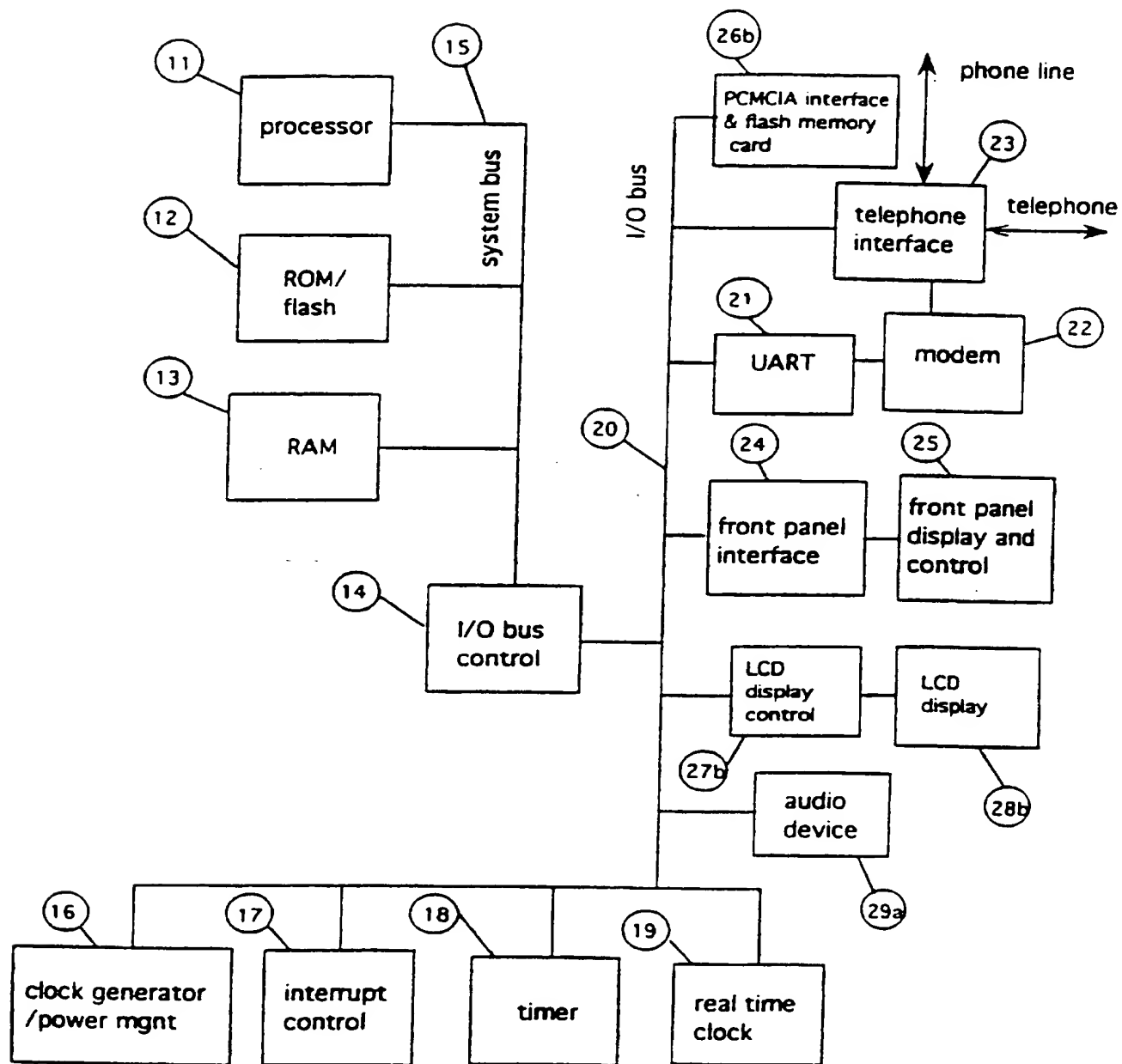


Fig 2d. Example of the E-mail apparatus implementation

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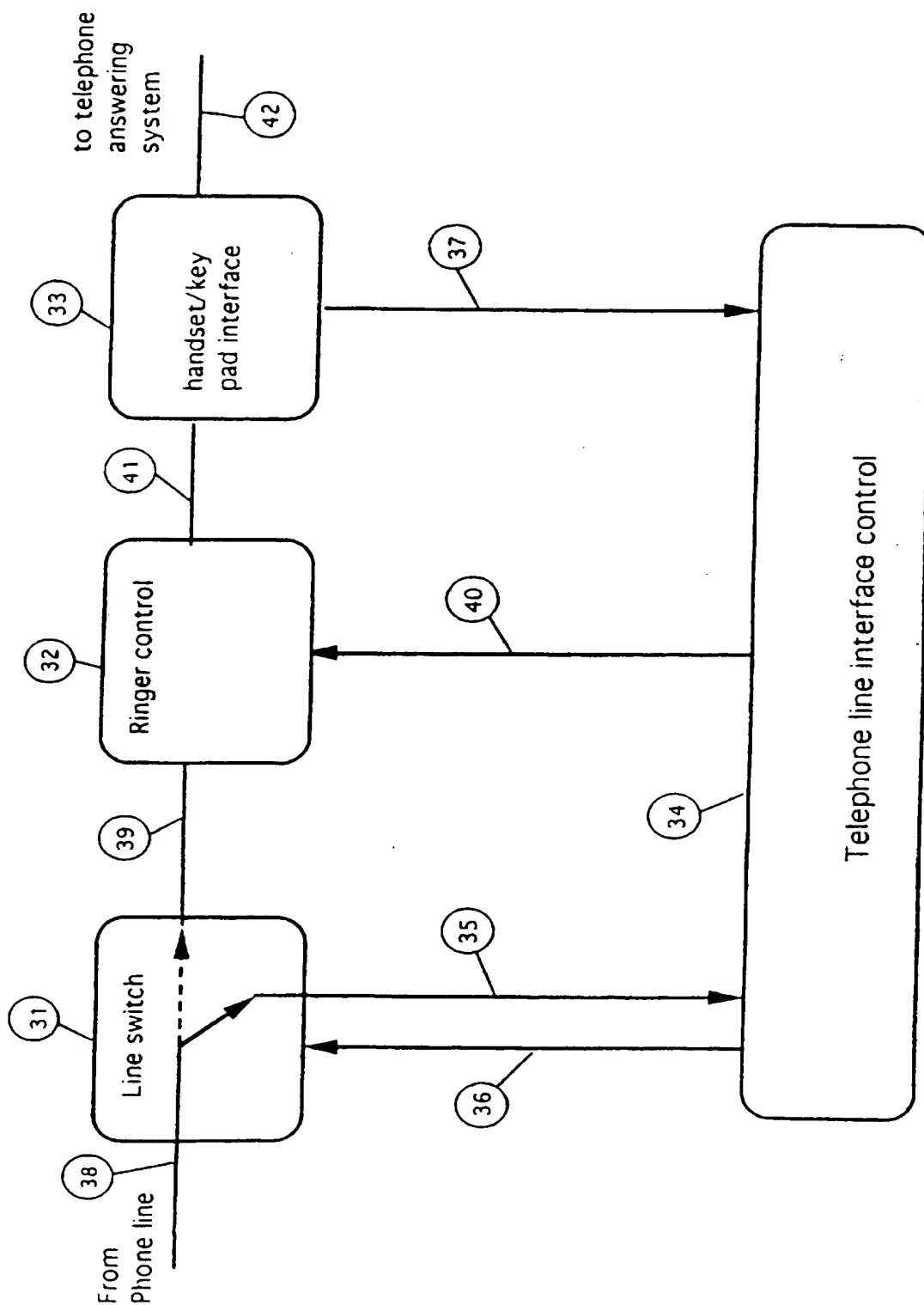
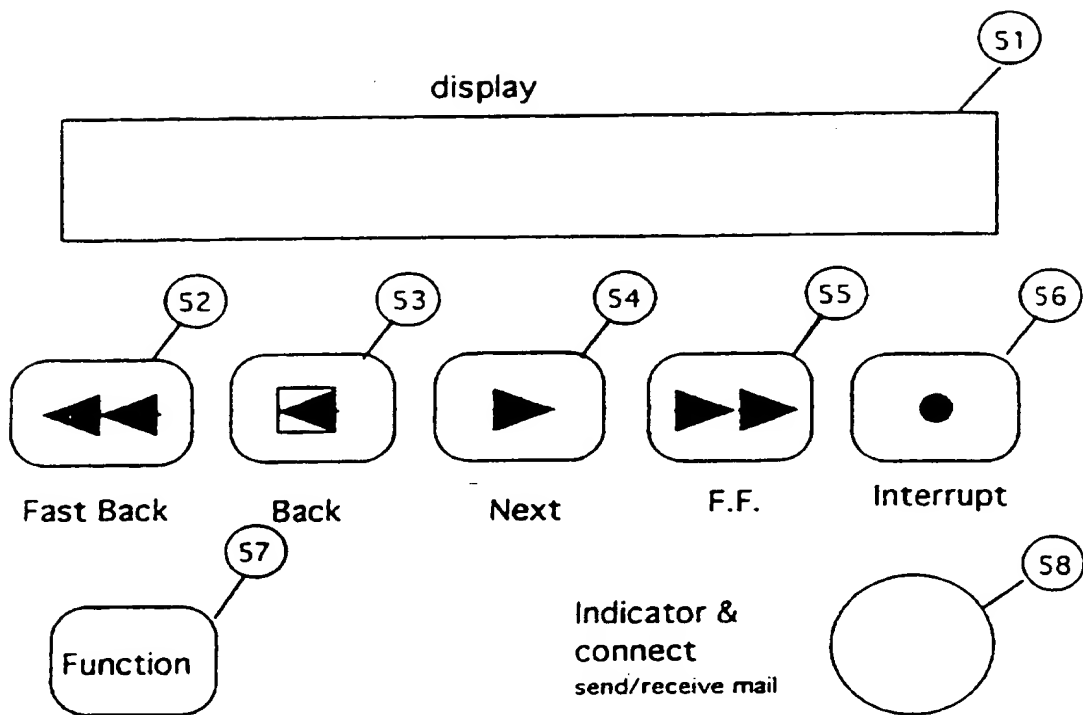


Fig. 3 Telephone interface block diagram

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**Figure 4: Front panel interface**

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Special functions

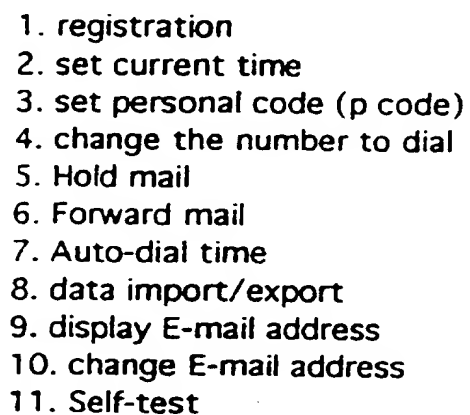
- 
1. registration
 2. set current time
 3. set personal code (p code)
 4. change the number to dial
 5. Hold mail
 6. Forward mail
 7. Auto-dial time
 8. data import/export
 9. display E-mail address
 10. change E-mail address
 11. Self-test

Figure 5: Example of special functions menu

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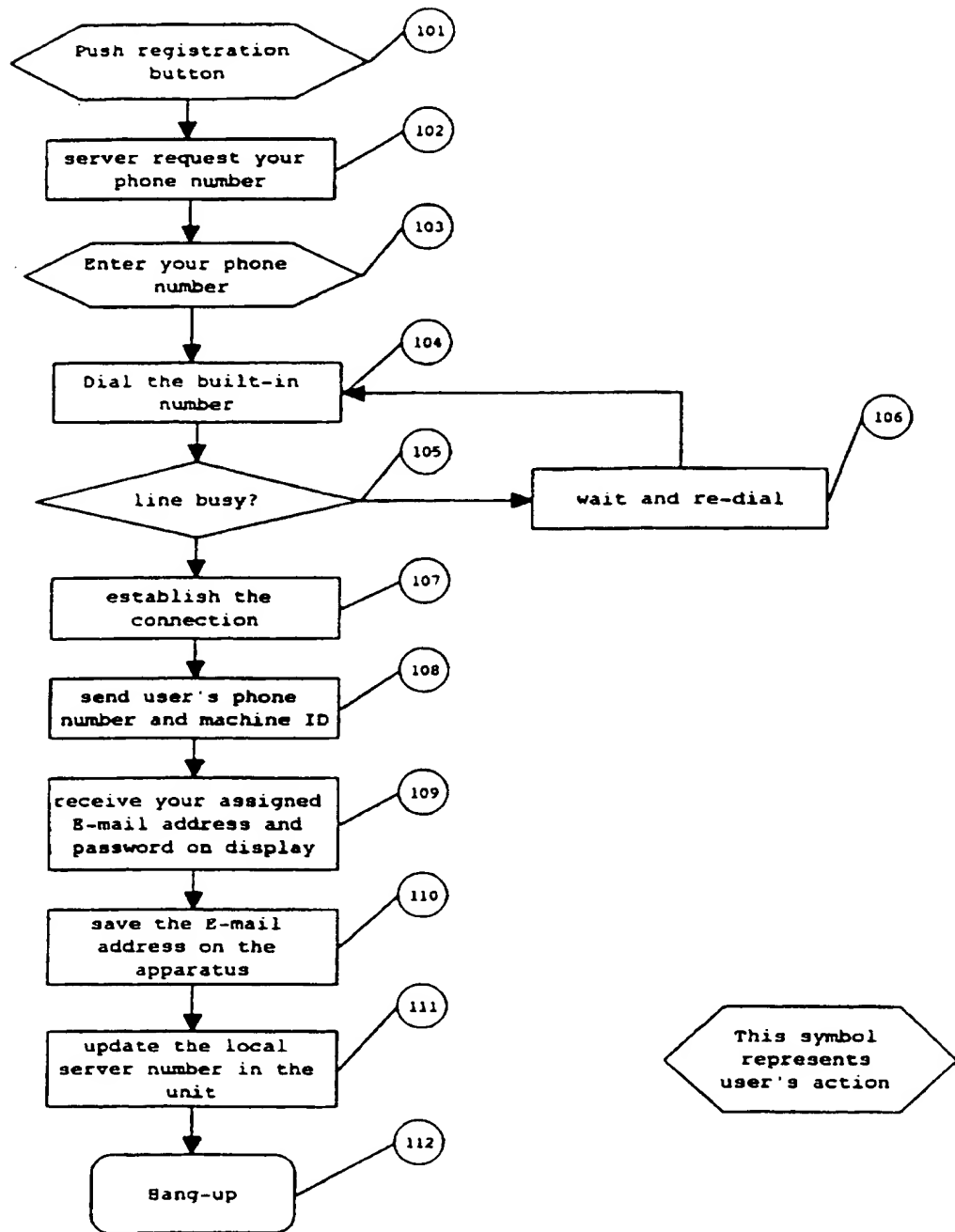


Figure 6: Easy registration flow

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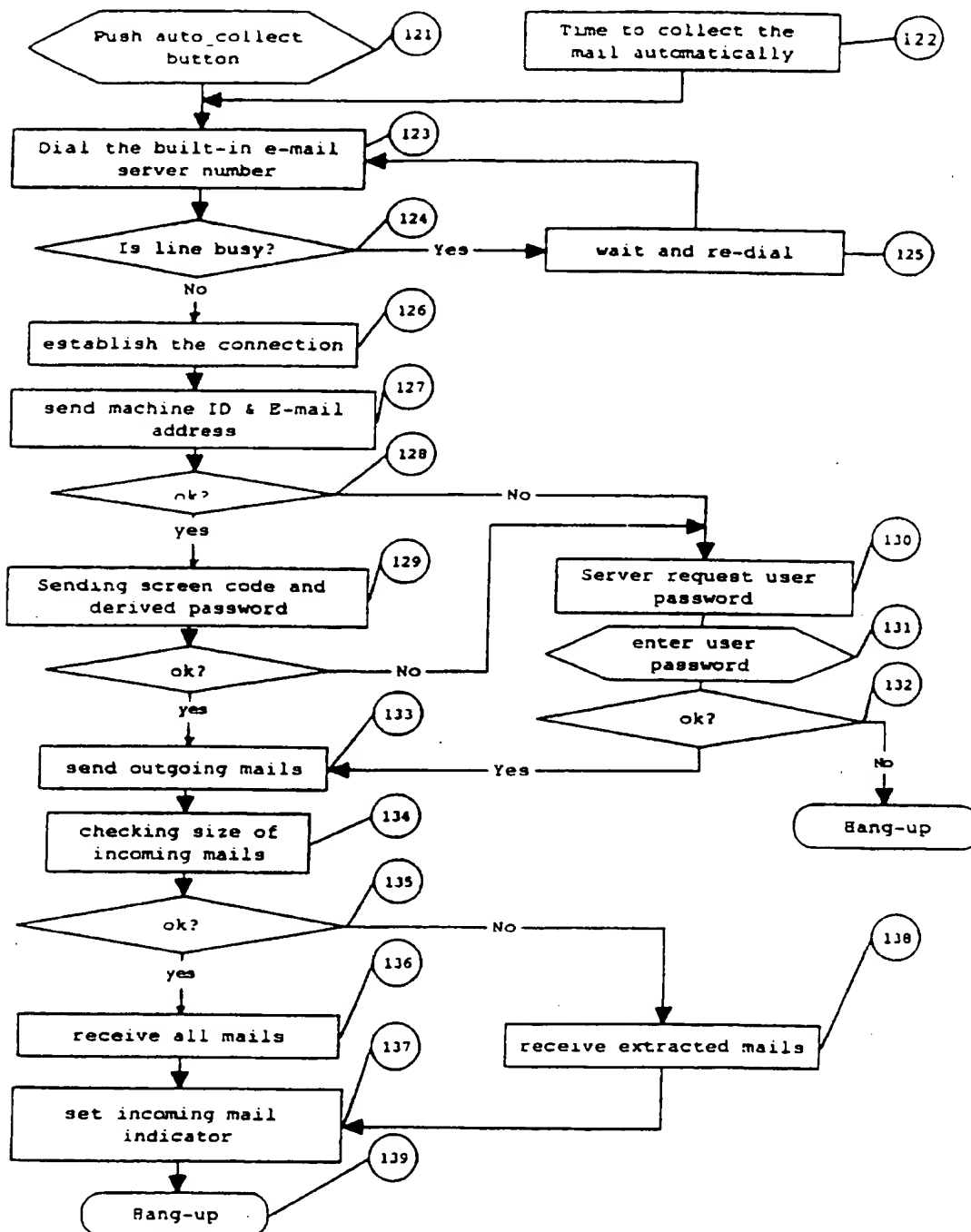


Figure 7: E-mail collect flow

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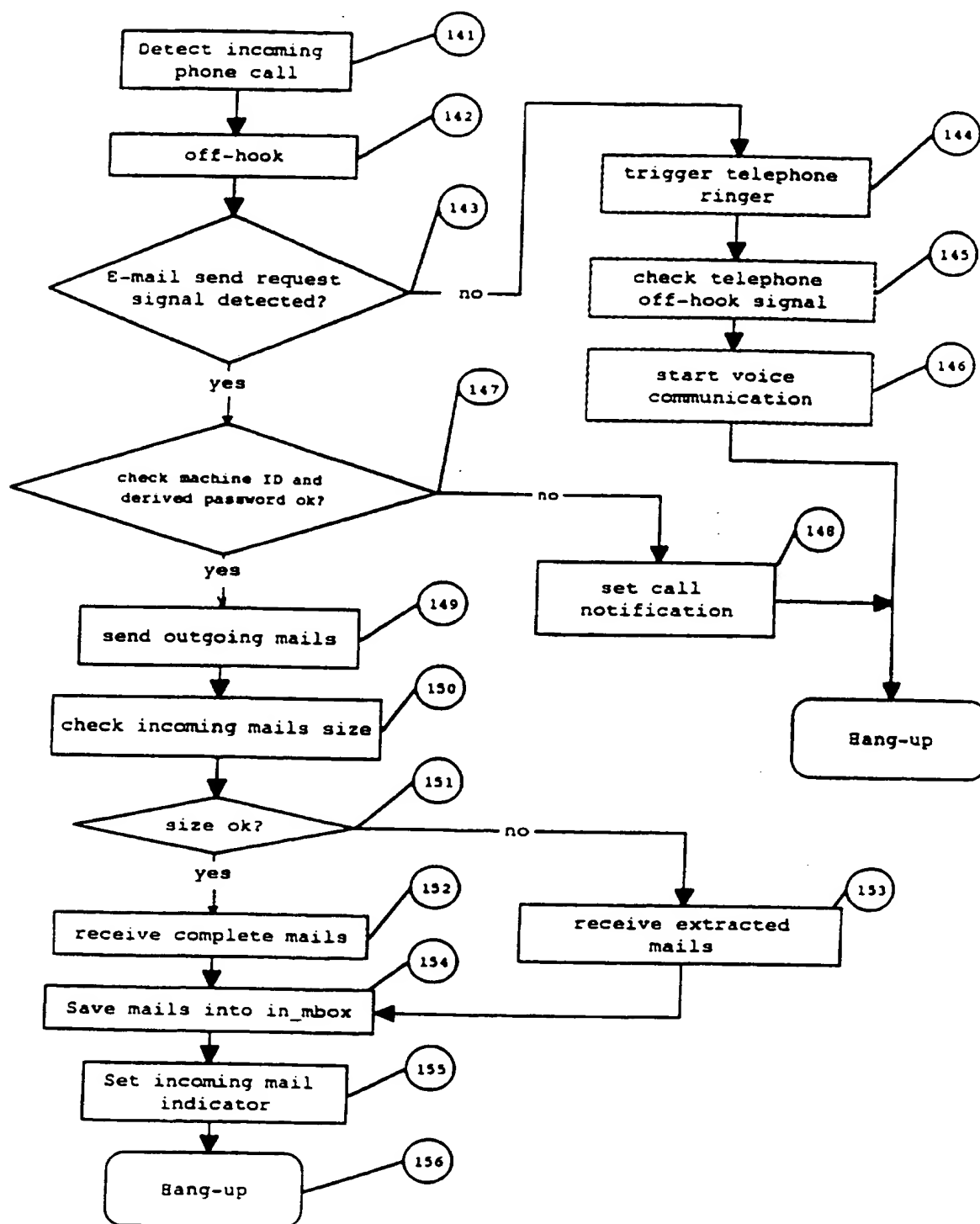


Figure 8: Apparatus's response to E-mail server

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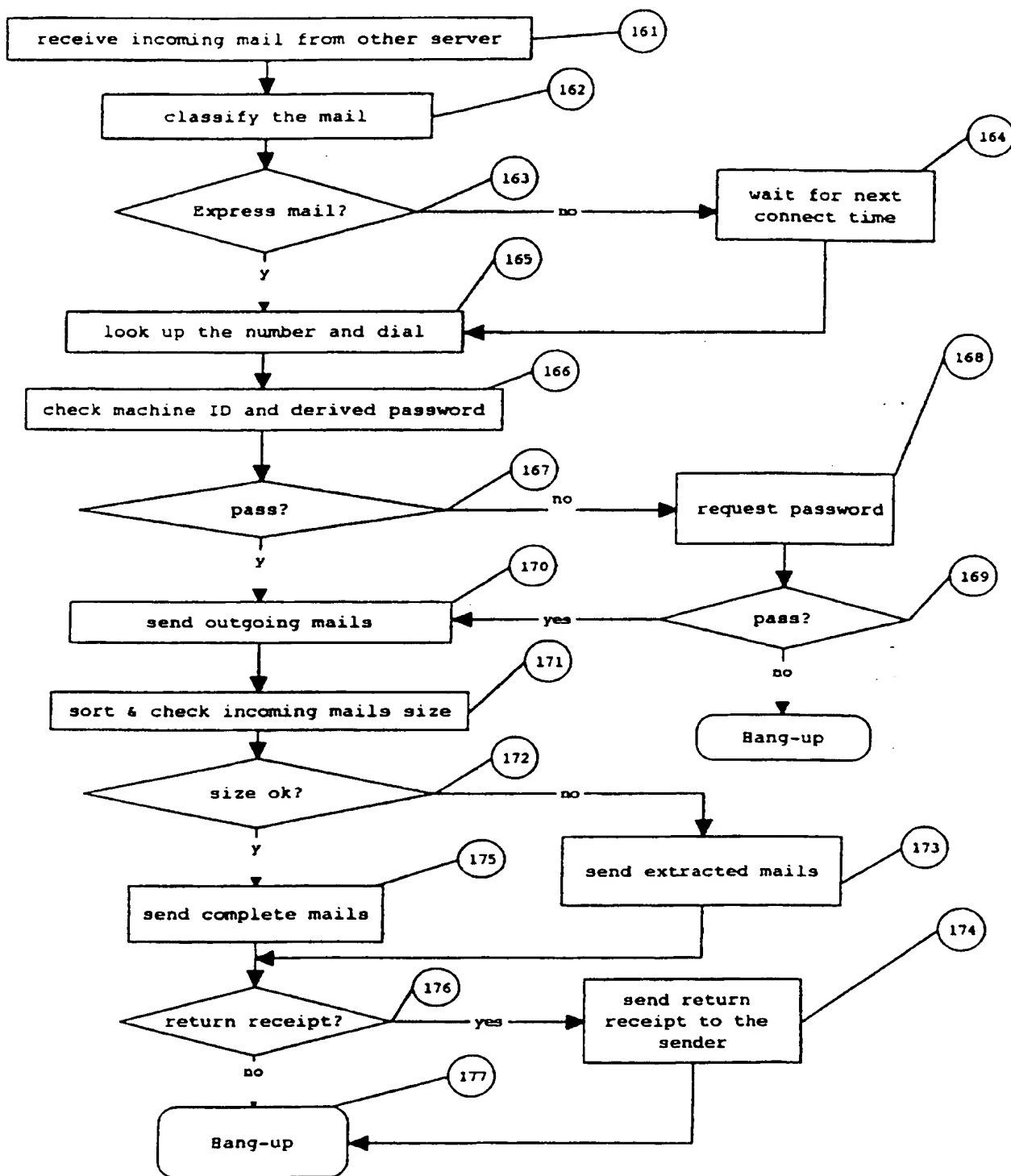


Figure 9: E-mail server mail process flow

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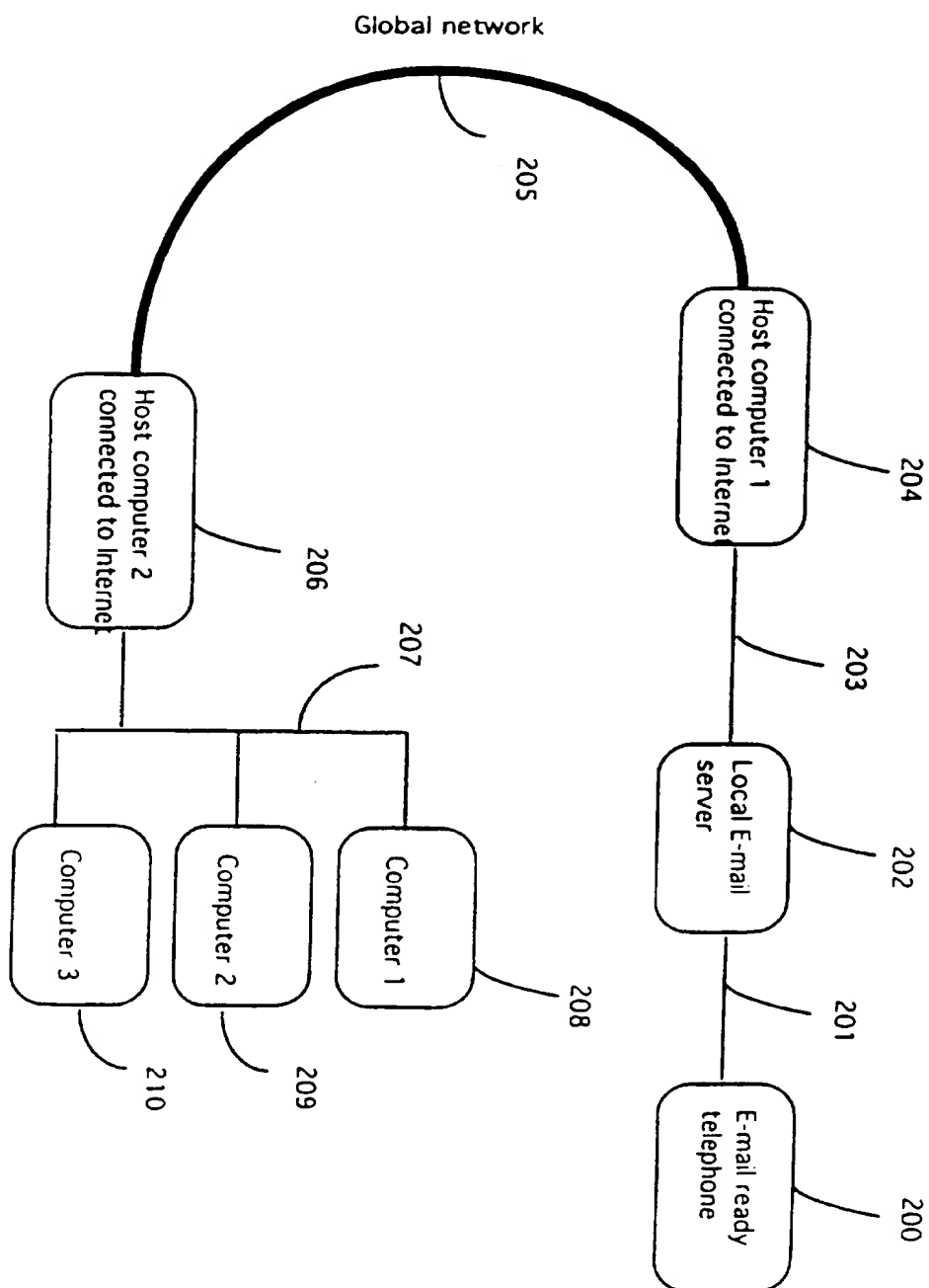


Fig. 10 Network connection diagram

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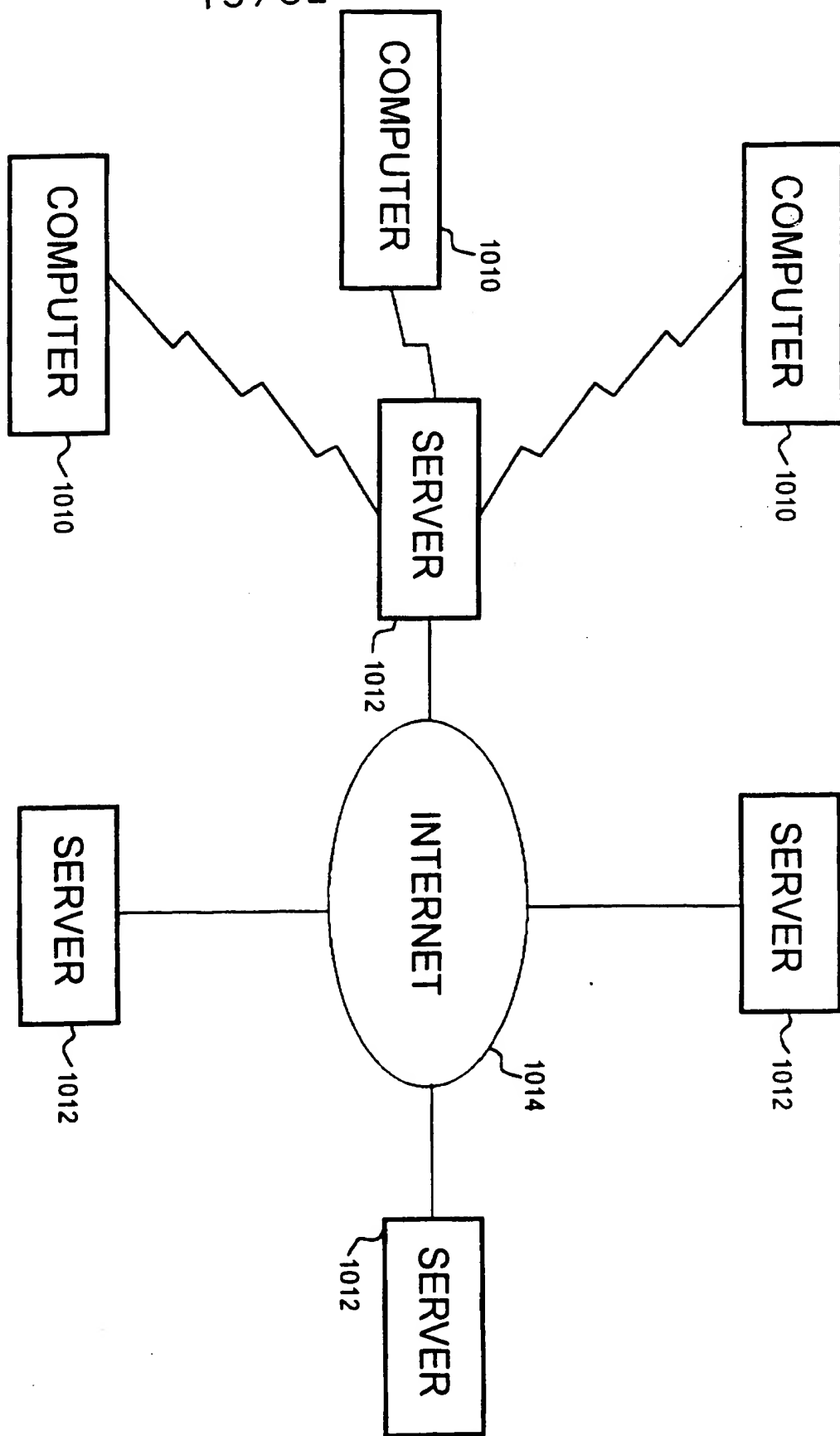


Fig. 11

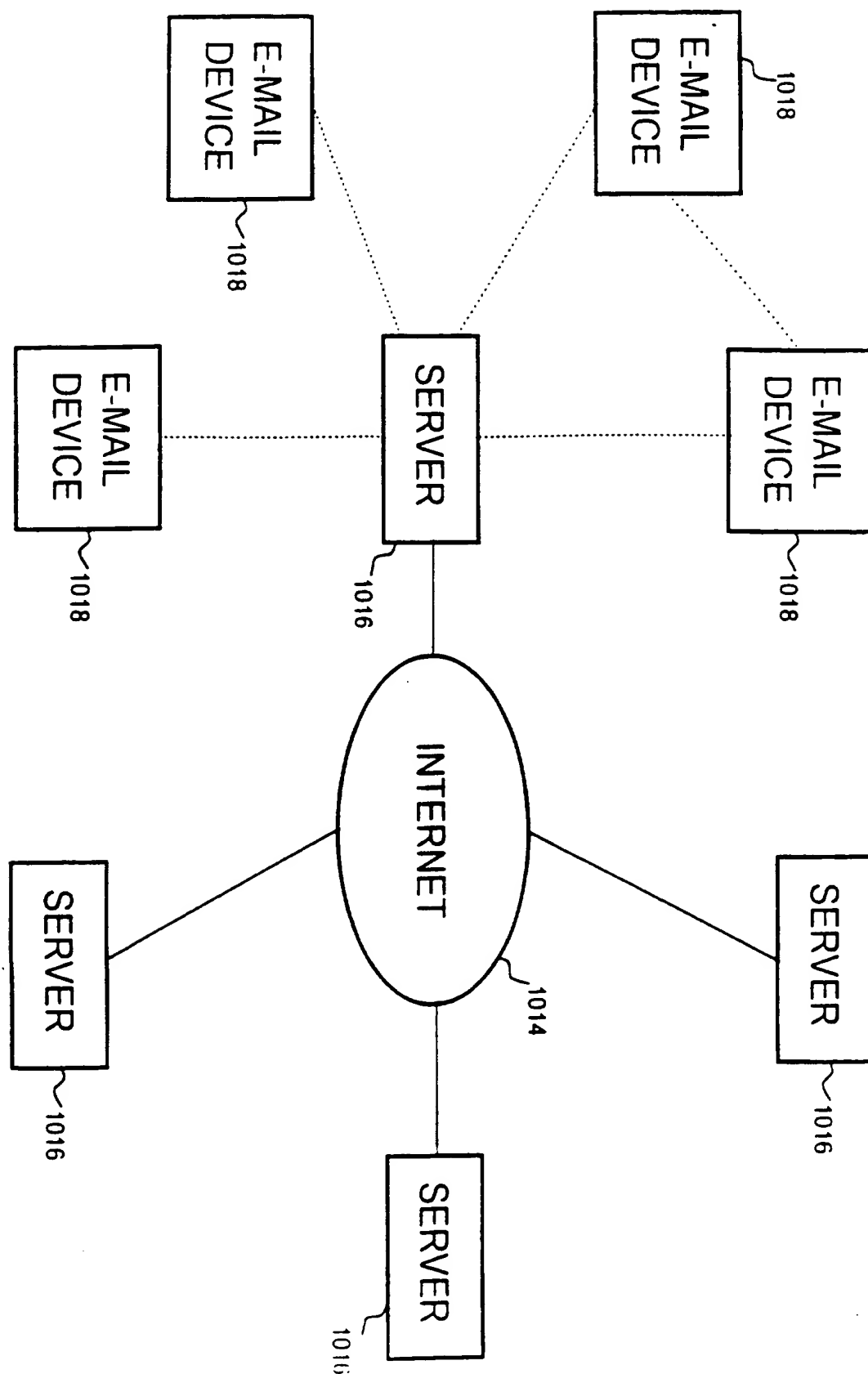


Fig. 12

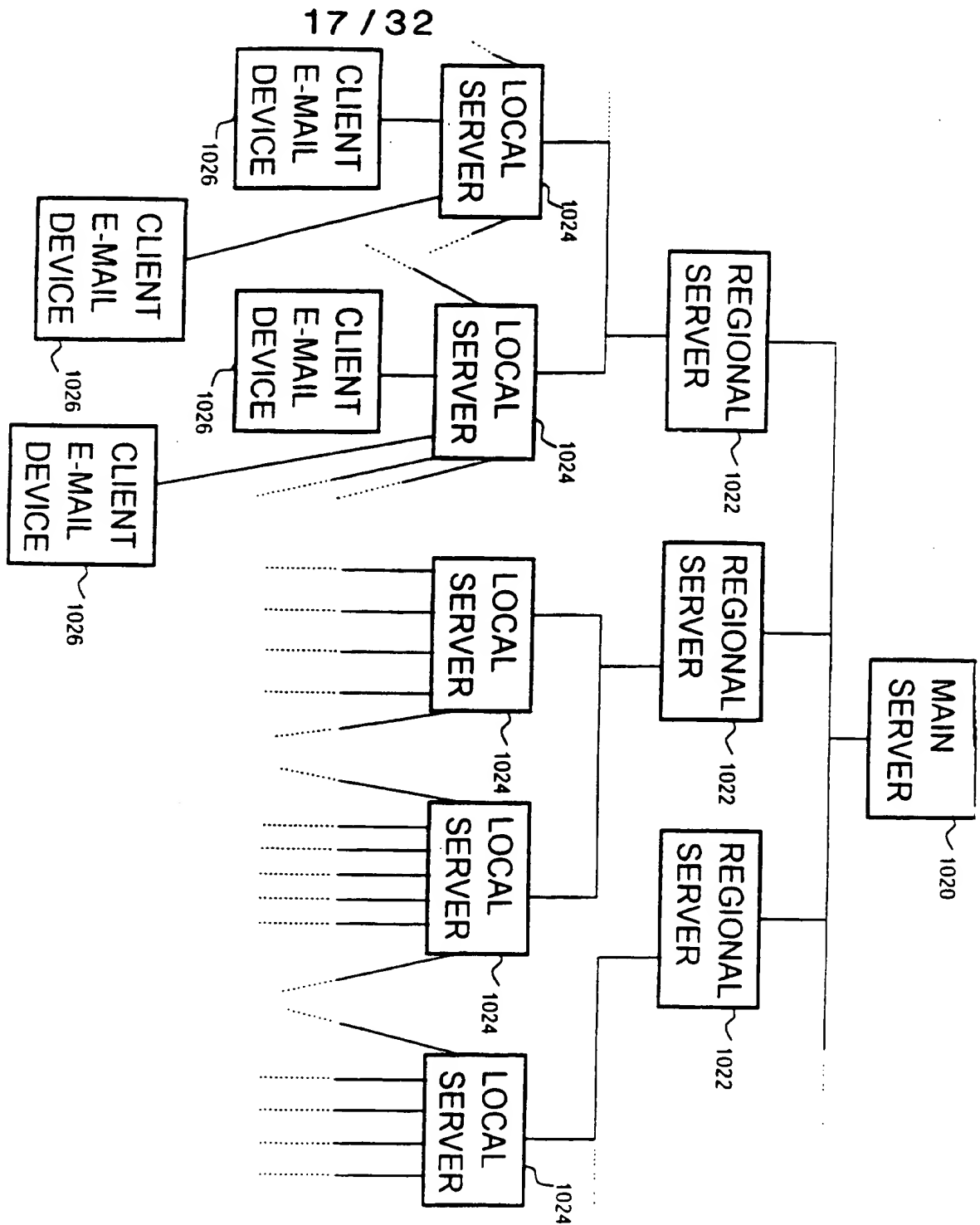


Fig. 13

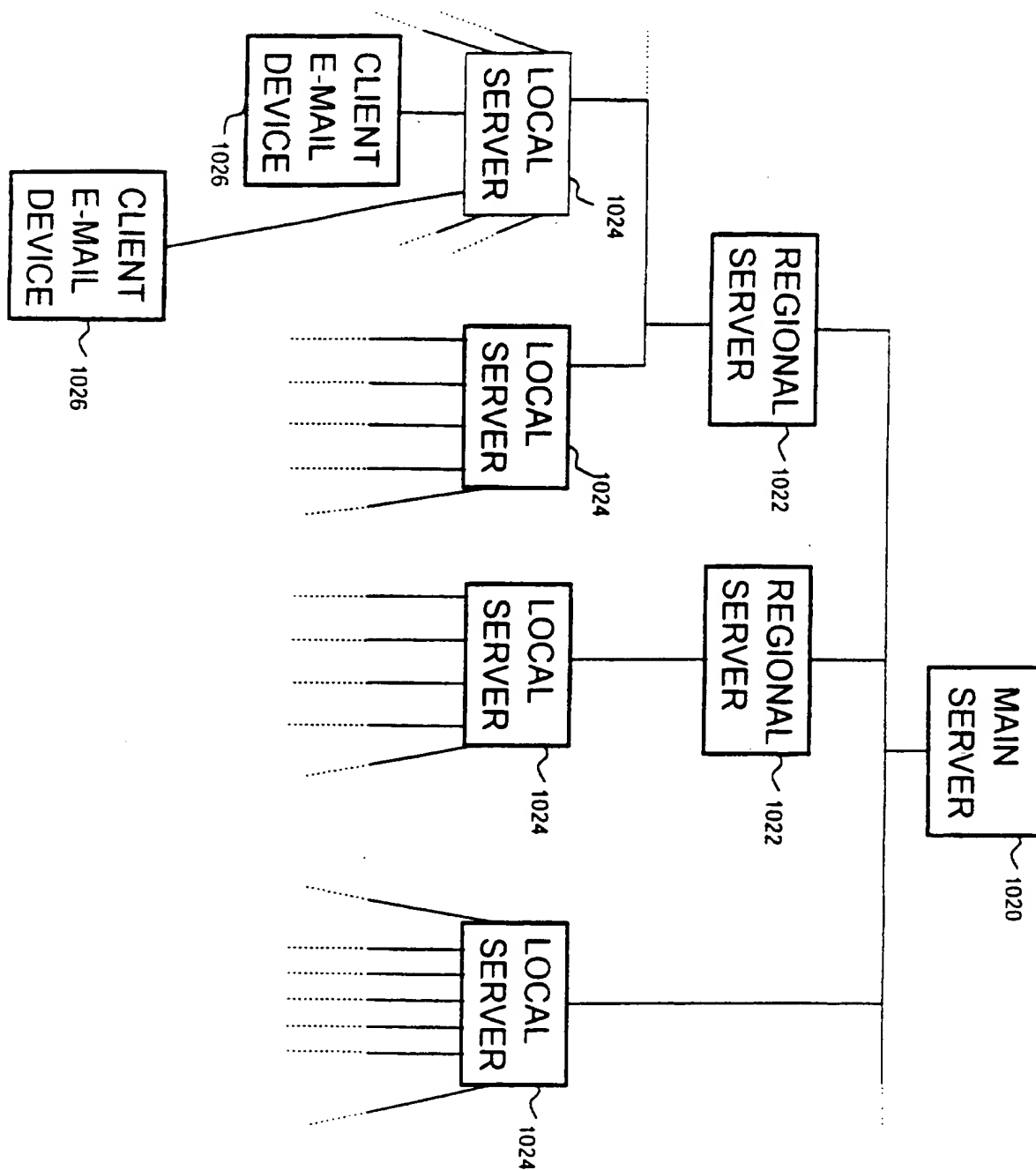


Fig. 14

Fig. 15

Registration Process:

- get machine ID
- get security code
- get notification code from e-mail device
- get phone number for e-mail device
- search for the phone number of the
corresponding local server
- send local server phone number to
e-mail device
- update tables for this client

Fig. 16a

Main_Mail_Process:

- Every x minutes
 - Process_Incoming_Mail
 - Process_Outgoing_Mail

Fig. 16b

Process_Outgoing_Mail:

- check for new outgoing mail every y minute
- if new outgoing mail found,
 - for each outgoing mailbag
 - decompress mailbag
 - extract outgoing mail messages
 - pass out outgoing messages
 - to send mail utility

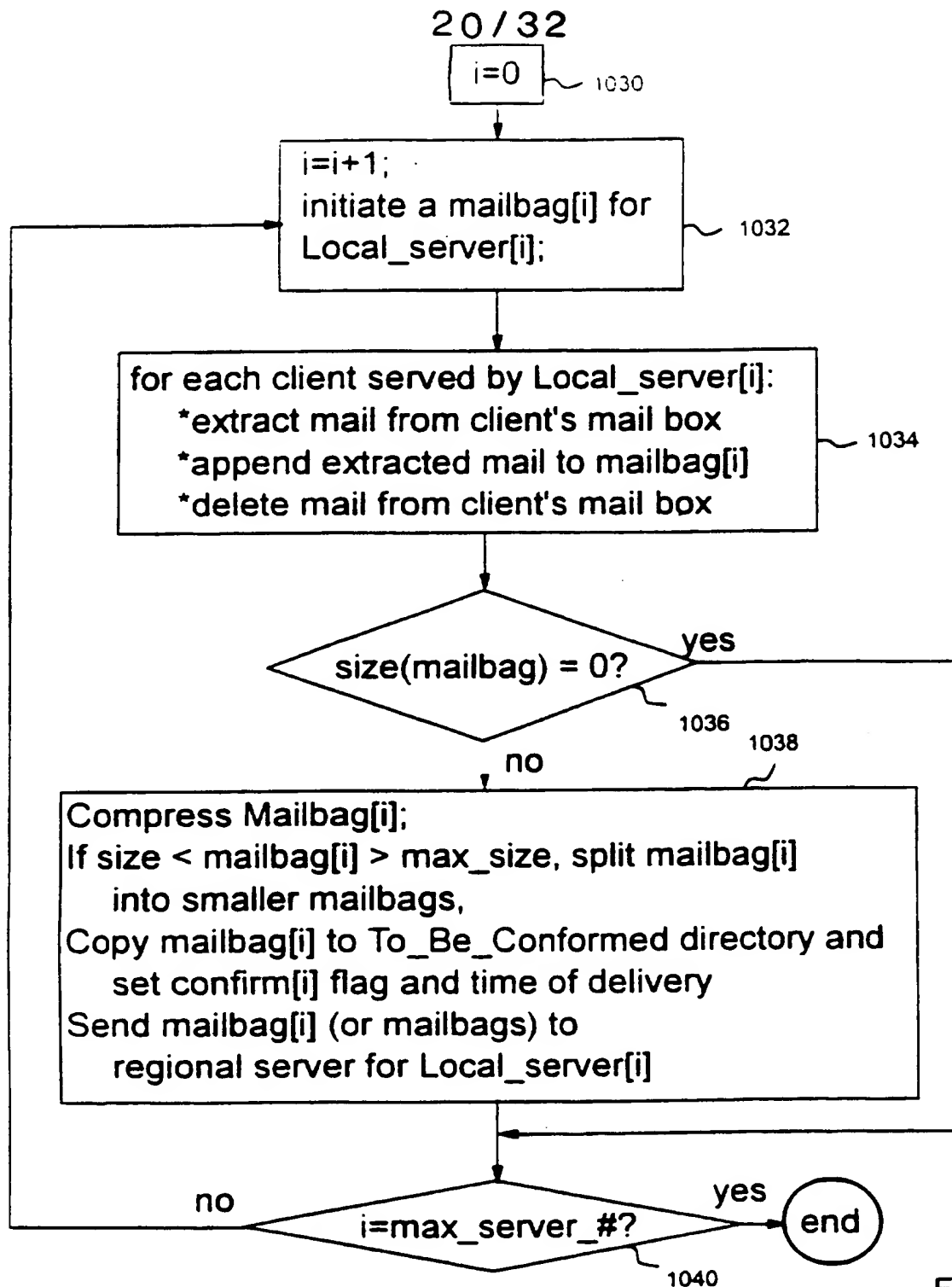


Fig. 16c

```
Confirm_process:
Every w minutes
  for each confirm[i]=true
    search confirmation mail message from local server[i];
    if confirmation found
      if not all mail message in mailbag[i]
        are delivered
          if elapsed time > max_elapse_time,
            extract and place undelivered
              mail message in delivery_failed
                directory;
            notify operator;
    if confirmation not found and
      elapse time > max_elapse time;
      notify operator;
```

Fig. 16d

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Fig. 17a

```

Every x minutes
  get mailbag from regional server
  decompress mailbag
  extract mail message from mailbag
  identify & place mail into recipient clients'
    m_box

```

Fig. 17b

```

Every x minutes
  For each client[i]
    if client[i], m_box is not empty
      case(notification method):
        notify_only:
          notify_process;
        call_back_mail_delivery:
          call_back_mail_delivery;
        direct_mail_delivery:
          direct_mail_delivery;
      end

```

Fig. 17c

```

Notify_process:
  get last_logon_time of client[i]
  check_new_mail for client[i]
  if no new mail, or if notification has been sent already, exit;
  else
    label1: call (client[i] phone number)
      if busy; wait x minutes and goto label 1;
    detect_ring_tone for client[i]. x1 second & disconnect;
    wait w1 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x2 second & disconnect;
    wait w2 second;
    call (client[i] phone number); if busy; wait x minute and goto label 1;
    detect_ring_tone for client[i]. x3 second & disconnect;

```

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Fig. 17d

```

Call_Back_Mail_Delivery:
  try_counter=0;
label 2: Notify_Process;
  Set AutoAnswer for x period of time
  If client calls back within x period of time
    Begin
      Handshake;
      Exchange_Mail_File;
      Disconnect;
      Send_Confirmation To_Server;
      Send_Outgoing_Mail To_Server;
    end
  Else
    If try_counter > max_try
      Report error to server
    Else increment try_counter
      goto label 2
    end
  end
end

```

Fig. 17e

```

Direct_Mail_Delivery:
  Try_counter=0
label 3: Call Client
  If no reponse from E-mail device
    increment try_counter
    If try_counter > max_try
      report error to server
    Else
      goto label 3
    end
  Else
    Handshake;
    Exchange_Mail_File;
    Disconnect;
    Send_Confirmation To_Server;
    Send_Outgoing_Mail To_Server;
  end
end

```

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Fig. 17f

Handshaking:
 Check security code
 If security code incorrect
 disconnect;
 report unmatched security code to server
 Else
 Check machine ID
 If machine ID incorrect
 disconnect;
 report unmatched machine ID to server;
 end

Fig. 17g

Exchange_Mail_Files:
 Retrieve outgoing mail from client e-mail device;
 Get available storage size on e-mail device;
 If incoming mail message > available storage size
 Repackage_Mail_Messages;
 Send incoming mail to e-mail device;
 Disconnect;

Fig. 17h

Repackage_Mail_Messages:
 Sort incoming mail in order of priority
 Select mail in order of priority up to available storage
 size and leave space for a system mail message
 indicating more mail messgae at the local server

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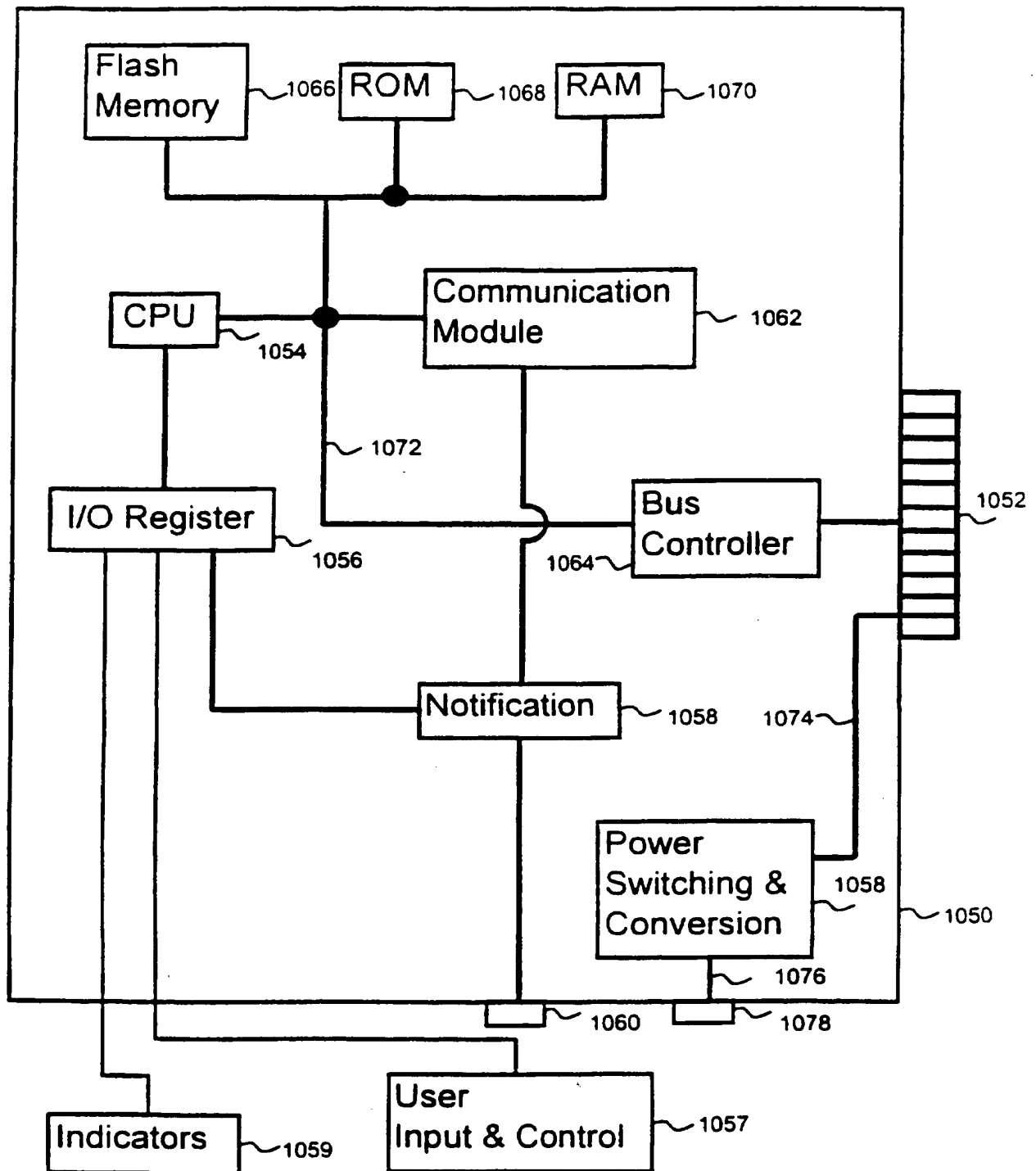


Fig. 18a

Fig. 18b

```
procedure Get_mail;  
  check_card_status  
  if busy wait                      // wait until it is not busy  
  else  
    begin  
      check_inmail.  
      if not empty move the mail to host  
      empty the inbox on card  
      display_mail  
    end
```

Fig. 18c

```
procedure Send_mail;  
  check_card_status  
  if busy wait                      // wait until it is not busy  
  else  
    begin  
      check_outmail_space  
      if space available, move the mail to card  
      done  
    end
```


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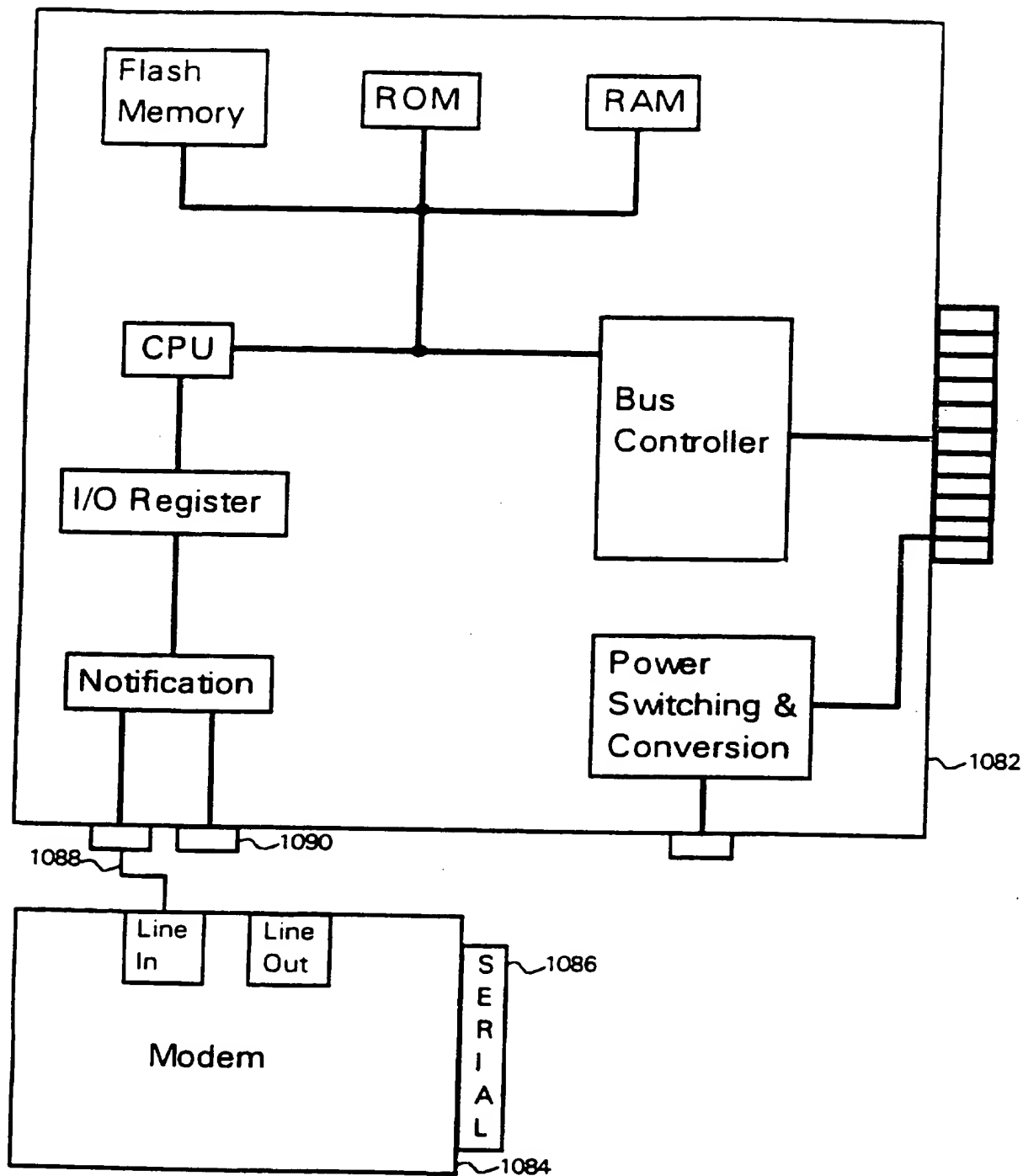


Fig. 19a

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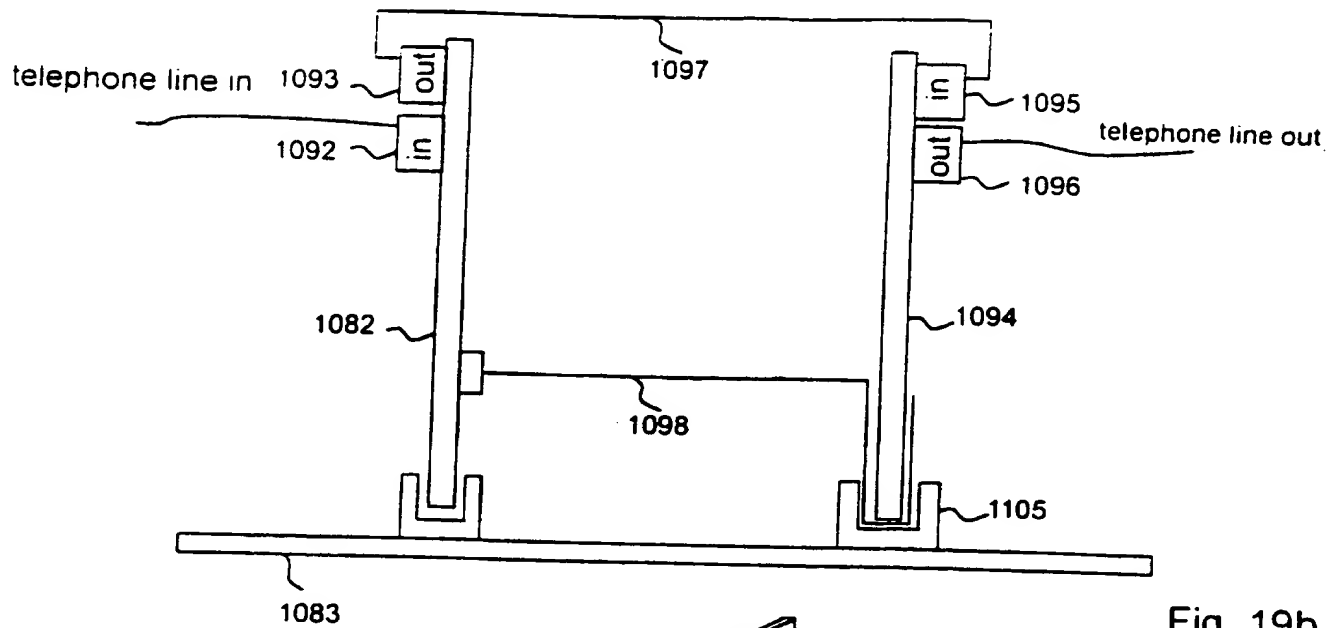


Fig. 19b

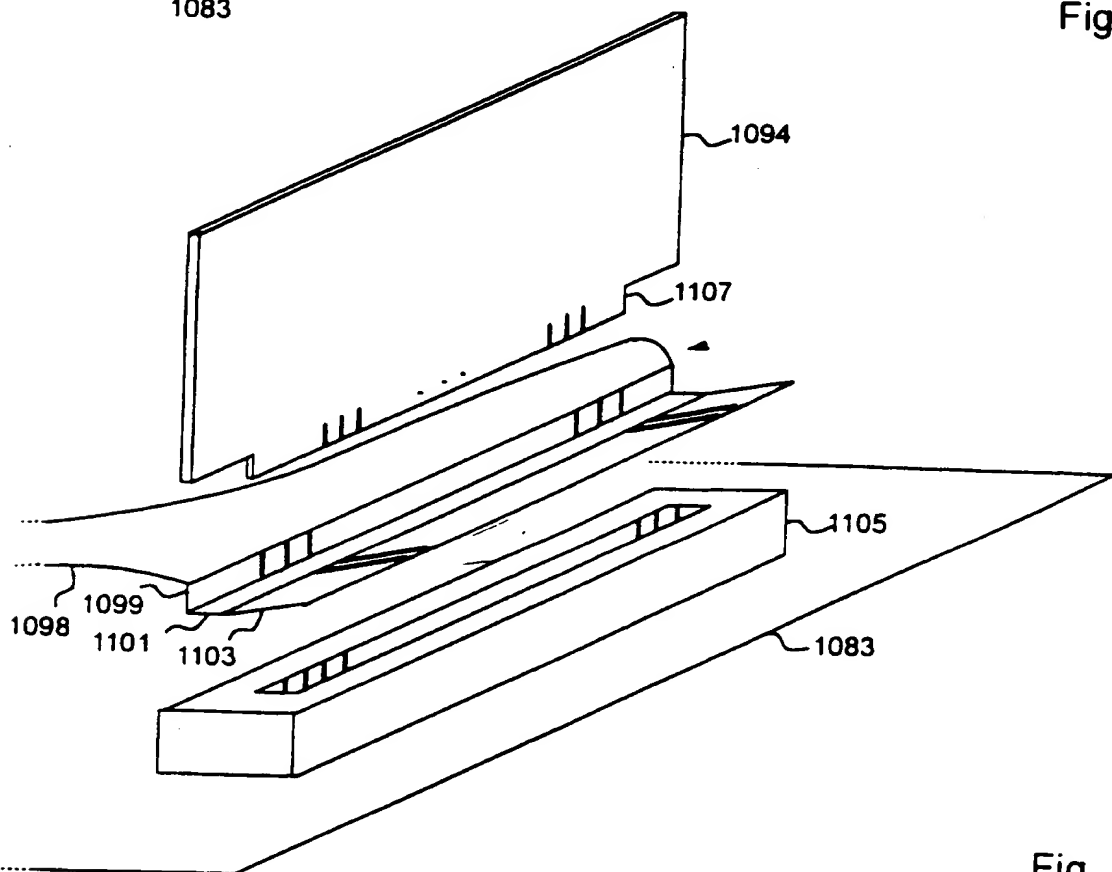


Fig. 19c

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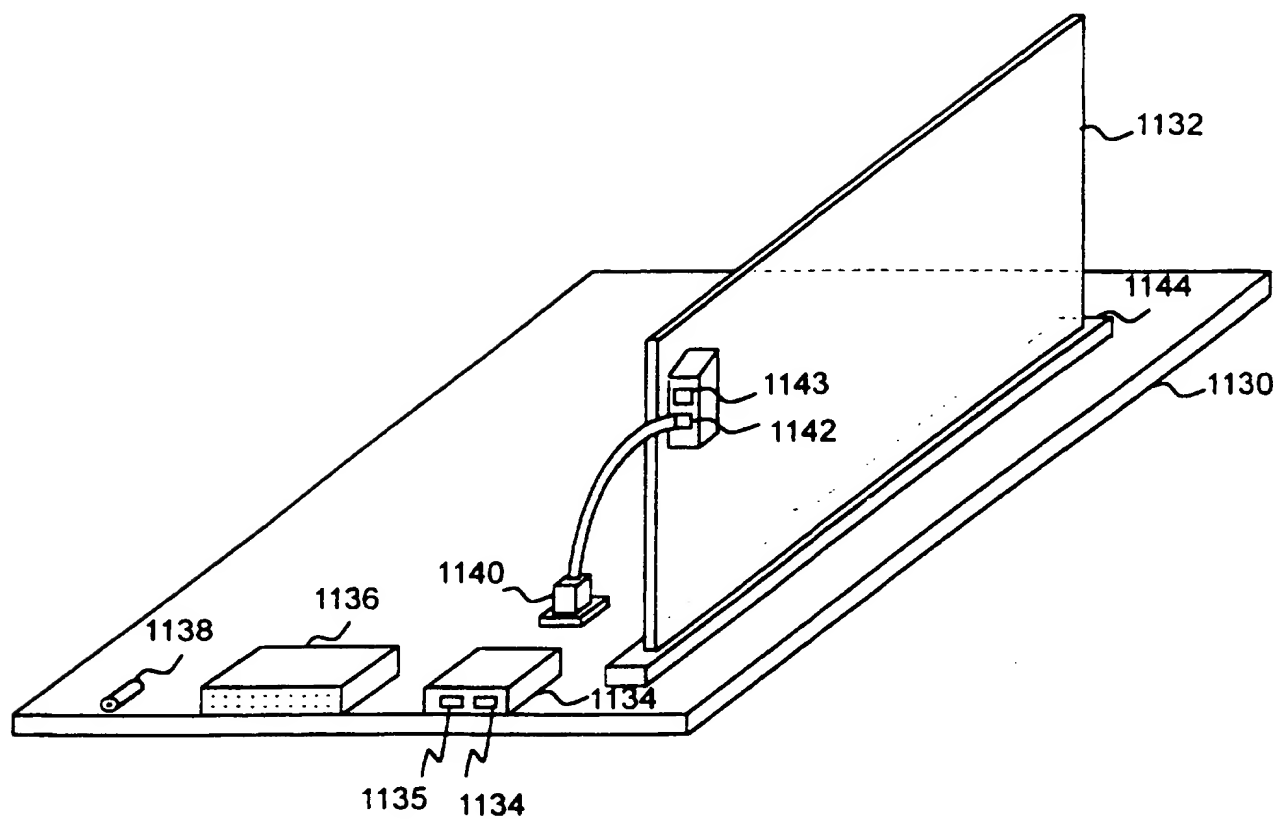


Fig. 19d

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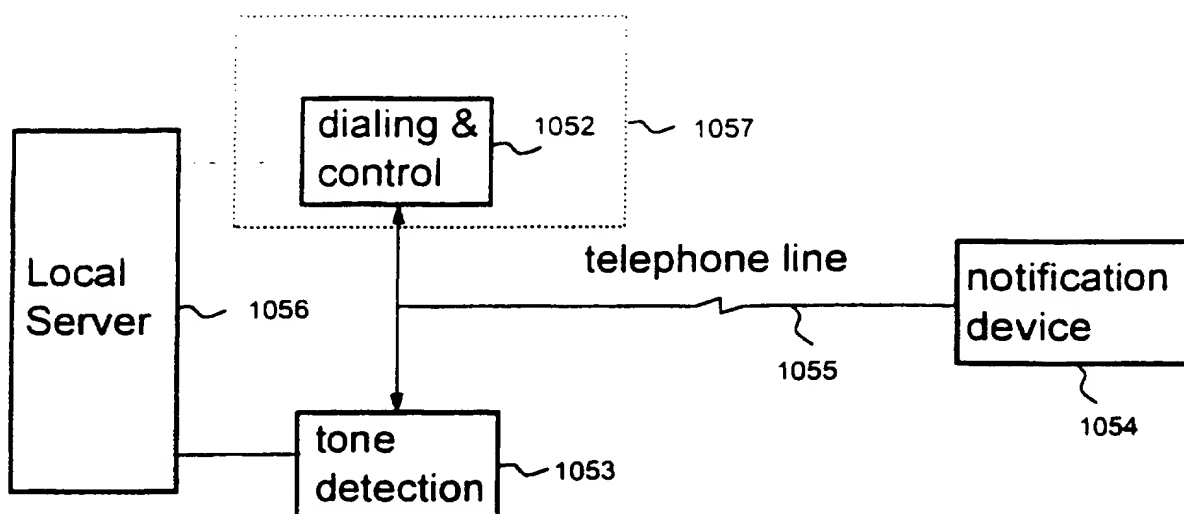


Fig. 20

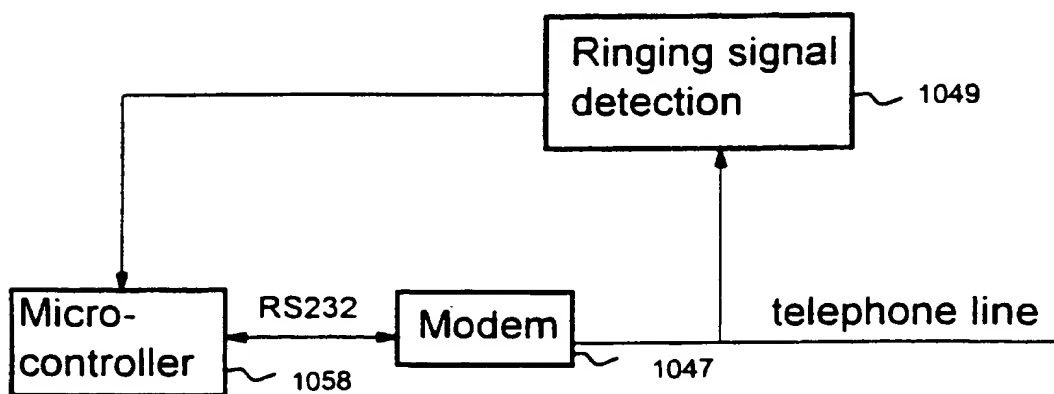


Fig. 21

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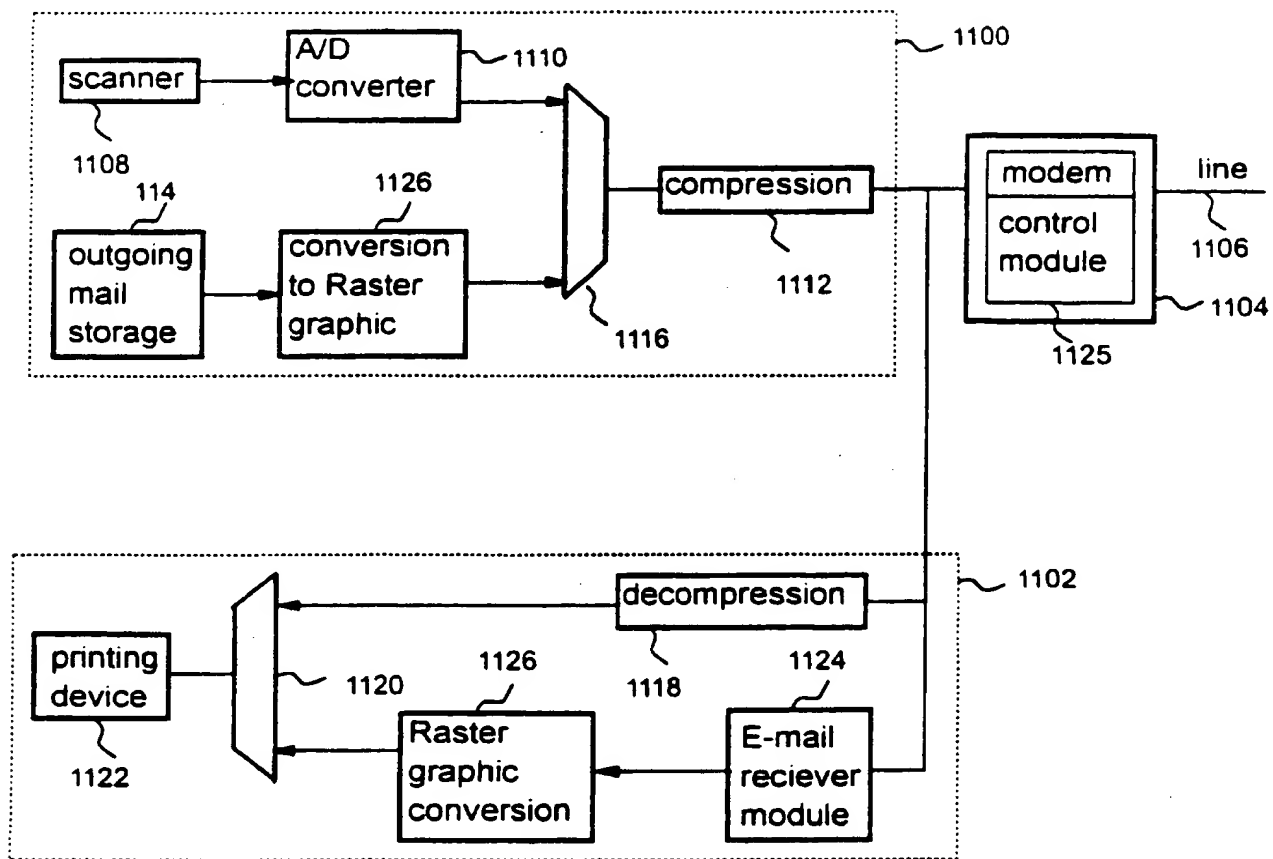


Fig. 22

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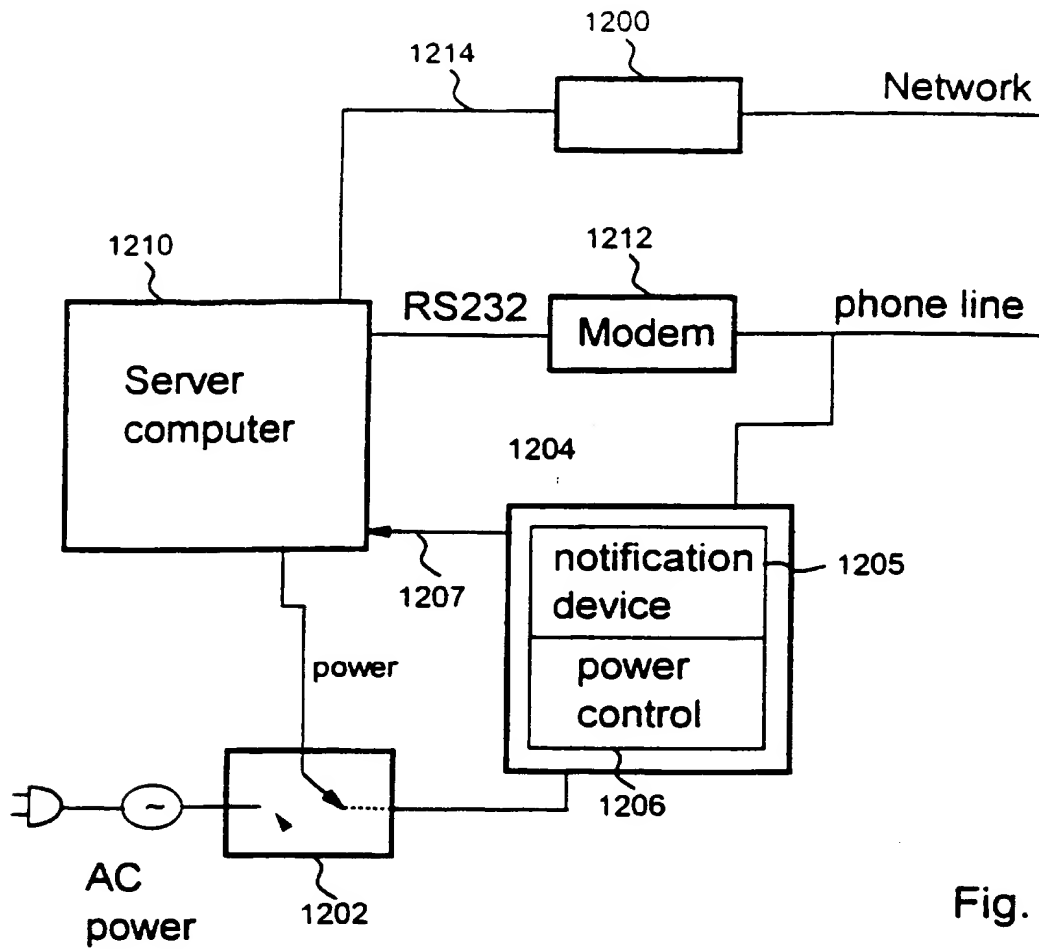


Fig. 23

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/11076

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : H04M 11/00

US CL : 379/96

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 379/96,90,94,97-99,110,67,88,89,142. 348/6,7,14. 370/61.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 4,837,797 (FRENEY, JR.) 06 June 1989, see abstract, all figures.	1-27

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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* A* document defining the general state of the art which is not considered to be part of particular relevance	* X*	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
* E* earlier document published on or after the international filing date	* Y*	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
* L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	* &*	document member of the same patent family
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Date of the actual completion of the international search

23 AUGUST 1996

Date of mailing of the international search report

09 SEP 1996

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